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Index to Advertisers—Page xi.

Principal Contents:

	PAGE
A Lavish Lighting Display. By H. S. Allpress	363
Electricity and the Atmosphere. By Prof. C. A. Middleton Smith	365
Making Plaster Boards	367
A Large Australian System	368
Porgress in Public Lighting	369
The Engineering and Marine Exhibition	371
Industrial Applications of Science	373
Electricity in Coal Mines	375
Correspondence: Engineering Status; Lamp-holder Troubles; Examinations for Electricians; Lighting and Road Services; Concrete Lamp Standards	376
New Apparatus and Devices	377
Electrical Trade with Argentina	379
Business and Industrial Notes	380
Fire Factory Extensions	383
Electricity Supply	384
Traction	385
Communications	386
Contract Information	387
Notes	388
Our Personal Column	389
Financial Section	390
Published Specifications	393
New Work for Contractors	394

Electricity in Mines

NO reliable figures exist, so far as we are aware, of the consumption of electricity in collieries. Some idea of its magnitude, however, may be gained from the capacity of motors installed—more than two million h.p. Without the aid of anything like the equivalent of a rapidly increasing domestic load, electrification has advanced steadily from year to year since completed records became available.

Progress over the past eighteen years is strikingly indicated in a number of graphs that are included in the Report of the Electrical Inspector of Mines for 1936, which is reviewed in this issue. During this period the aggregate capacity of motors has advanced from 587,000 to 1,109,000 h.p. below ground and from 442,000 to 987,000 h.p. above ground, while the number of electrically driven coal cutters is two and a half times what it was in 1919.

That is not the whole story, however, as the graphs relate the numbers of fatal and non-fatal accidents each year to the h.p. installed, and ignitions of fire-damp to the development of electric coal cutting. They fully substantiate the evidence given last October by the Electrical Inspector, Mr. J. A. B. Horsley, before the Royal Commission on Safety in Coal Mines, which showed that, notwithstanding the increased use of electricity, the number of accidents has remained at an almost constant figure.

This means, as he says, that absolute danger due to electricity does not increase, while relative danger actually decreases. He attributes this to improvements in plant and its applications having offset any effect of the greater use of electricity.

This view appears to receive support from a reduction in recent years in the number of accidents ascribed to defects in design or unsuitability of apparatus. It would be unwise to be dogmatic on the lessons to be learned from statistics when the instances are so few as they are for electrical accidents, *viz.*, 10.7 per annum fatal and 53.5 non-fatal, averaged over the past ten years, but further confirmation of this opinion is obtainable from the analysis of accidents which Mr. Horsley gave in his presidential address in June to the Association of Mining Electrical Engineers.

In this address it was shown that mishaps due to electricity within the last decade had formed the microscopic proportion of 0.027 per cent. of the total number of mine accidents which had incapacitated anyone for more than three days.

So much is necessary to see the risks attached to electrical working in their true perspective, but the fact that electricity is responsible for so relatively little harm to person or property does not remove the responsibility of all concerned to reduce the absolute risk.

Thus, of the ten accidents in 1936 that had fatal consequences, it is clear, from the particulars given in the Report, that not one would have happened but for carelessness or lack of adequate supervision. The same criticism applies also to most of the occurrences which had less unfortunate results.

Sound design and construction and flame-proof testing of apparatus at Buxton are obviously not enough to ensure safety. Skilled maintenance is also necessary, and there must be a proper organisation behind it. Not in all mines, by any means, is the principal electrical official accorded the status that is due to him. Nor is it realised that he should be capable of assuming full responsibility for seeing that the electrical plant is used as it ought to be.

Considerable credit is due for the relatively decreasing hazards of electricity below ground to the efforts of the Association of Mining Electrical Engineers over the past twenty-eight years to improve the standard of operation. Its work, carried to a logical conclusion, will achieve still more in the future in the direction of securing safety in mines.

The Battersea Extension

IN this issue we give leading technical particulars of the 100,000-kW of plant which will form the first third of the new wing of Battersea power station. The adoption of higher steam conditions was not unexpected, despite the remarkable performance of the first half of this station. Sir Leonard Pearce, engineer-in-chief of the London Power Co., not content that first place in thermal efficiency should have been secured among British stations, has for some time been investigating alternative schemes for exploiting recent developments to the utmost, bearing in mind the need to secure continuous operation over long periods. In deciding upon the adoption of the highest possible steam temperature, Sir Leonard informs us that he has been influenced by the consideration that, while pressure increases obey the law of diminishing returns, temperature increases follow an almost straight line law. It seems probable that unless some as yet unexpected development takes place much the same operating cycle will be used for the remaining two-thirds of the new section.

Amalgamation or Co-ordination

ADDRESSING the Nottingham City Business Club recently on "The Future of the Electrical Industry," Mr. H. M. Drake, Past-President of the Electrical Contractors' Association, said that so far as the contractors were concerned much could be done by amalgamation. This would make it easier for manufacturers and wholesalers to see where orders were likely to come from and what their size might be. With proper organisation such contractor amalgamations would pool knowledge, reduce office work and tend to remove the bugbear of price cutting. Competition would become more reasonable, the quality of work would be improved and there would be better opportunities for good salesmanship. Mr. Drake's views run somewhat parallel with those which we have often expressed. For instance, in our issue of July 3rd, 1936, we said:

> "There seems to be a case for the closer regional organisation of the contractors themselves, so that a reconstituted supply authority, with powers over a wide area, would find a strong body of contractors in its area to take over its installation work as a whole and allocate it among the members. The problem of hire-purchase of the large apparatus could more easily be tackled by such a body working in conjunction with the supply authority."

Whether amalgamation or co-ordination is the better way is a matter for the contractors themselves to decide, but they should be doing some furious thinking.

Harmful Propaganda

THE contractors' cause will certainly not be assisted by such diatribes as that which has reached us through the post this week. Under the title of "The Case of the Electrical Contractor" some of the most utter tosh that could be written regarding the subject has been circulated by "A Contractor." The leaflet bears no imprint or any other sign of who is responsible for it. It is suggested that if the electrical contractor is exterminated (who wants to exterminate him?) all the "business and professions that surround and depend upon him" will be "reduced to labour" also that the electrical Press forgets that if the contractor is "wiped out" most of these journals would go too. We cannot imagine such remarks emanating from the E.C.A., and individual contractors, whether attached to that organisation or not, will do their cause more harm than good by shallow publicity of this kind.

Special Cases

IN a leading article recently we pointed out that an undertaking cannot regard non-compliance with the standards required by the I.E.E. Regulations as providing a reason for refusing to connect up an installation. We instanced the decision of the Electricity Commissioners that Luton Corporation was not justified in declining to supply a consumer whose socket outlets did not fulfil the requirements of general sound practice We do not see why this "very singular decision" should mystify anyone, as the *Electrical Contractor and Retailer*, in a reference to our leader, suggests it may. The Commissioners have expressed approval of the I.E.E. Regulations, but they are empowered merely to secure safety, not to enforce the adoption of certain standards, and there appears to have been no evidence of any risk of danger in the circumstances in question. Our contemporary refers to this as "a special and unfortunate case." There are, however, so many special cases of widely different kinds that undertakings cannot safely fall back on a code to guide them. They must consider in every case whether connection would introduce a risk of danger. It is hard on them, but that is the present position.

Argentine Considerations

MR. H. C. SIDDELEY, as a British trade missionary in South America, delivered a commercial address to the Argentine Local Centre of the I.E.E., of which he is chairman. Many of the points of the address (which we review on another page) have already been expressed in our pages by Mr. Siddeley, but there is at least one new practical suggestion which deserves emphasis. Electrical appliances for Argentina housed in heavy casings are subject to large import duties upon its whole weight. The essential apparatus could be imported with a much lower payment of duty and the housings could be provided by local factories. This arrangement would have a considerable effect upon the price, which is at present a great handicap. We would also back up Mr. Siddeley's appeal for active participation of British representatives in the standardisation proposals now in hand in Argentina to ensure that the ultimate specifications shall not be inimical to British manufacturers' interests.

Grit Emission

PULVERISED fuel, which at one time seemed likely to form a much larger proportion of the total tonnage of coal burned in public generating stations than the 15½ per cent. which is now its share, received a setback a few years ago. One reason was the advance in mechanical-stoker design; another was the difficulty of preventing the emission of grit from the chimneys. Lately, however, there have been signs of a revival of the favour in which the system was once held and important new installations have been put into service. This was to be expected from the findings of the Taite Committee five years ago that only particles of a diameter greater than 20 microns caused nuisance, and that these could be adequately dealt with by electrostatic precipitators in conjunction with chimneys of a height not less than two and a half times the height of the power station building. In view of this a proposal contained in a paper submitted by Mr. A. Tyler to the recent Sanitary Inspectors' Conference seems unnecessary, to say the least. He is reported to have advocated that the construction of further pulverised-fuel plants should be prohibited by law unless high-grade coal were used. The pre-cleaning of coal is to be advocated on many grounds, but all that local authorities need do is to ask that effect shall be given to the recommendations of the Committee.

Mastering the Machines

THOSE who regret the decay of handicraft are sometimes led by their imaginations to envisage a state of affairs in which men become almost literally the slaves of machinery. A sounder perspective was surely that shown by Professor F. G. Baily when he said at the British Association meeting that the machine is the master of the ignorant and dull-witted, but the servant of him who has understanding. He would have the training of apprentices (workmen as well as staff) applied more to the mind than it has been in the past, which calls for a liberal education rather than a narrow trade outlook. Highly developed manual skill will always deserve admiration, but it is not generally so necessary nowadays.

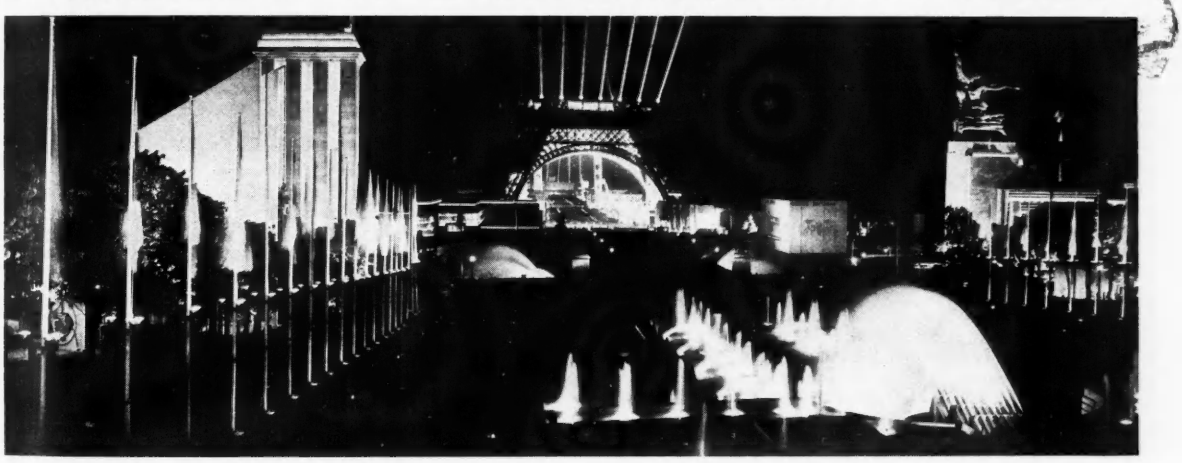
A Lavish Lighting Display. By H. S. Allpress

Impressions of the Paris Exhibition

THE extension of the period of the International Exhibition, Paris, to early next year prolongs the opportunity for English visitors to inspect the display and to see what modern lighting engineers and artists can accomplish.

The exhibition covers about 250 acres and has a frontage of over two miles along the Seine. Electricity is used everywhere for normal interior illumination, for effect lighting, and also, of course, for the general floodlighting of the buildings, gardens, and fountains. It is obvious that in most of the 200 pavilions the architects have realised that better effects and visibility of the displays can be obtained by use of electric light than is possible by daylight, which is almost entirely ignored in many cases.

The Palace of Light, by its very name, shows how important a branch of electrical engineering is that of light and lighting—even if only as spectacular publicity which everyone can appreciate, to show the convenience and adaptability of electricity as a source of heat and light. The Palace of Light has no windows; it is illuminated throughout by concealed and special floodlighting effects to show up the remarkable mural designs. Some space is devoted to the generation side of the industry, but the greater portion is devoted to lighting and equipment.



Above: A general view of the Exhibition looking from the terrace of the new Trocadero towards the Champs de Mars. Below: The same view by night

Some novel academical demonstrations of the E.L.M.A. type are included, but, apart from a large collection of lamps of different types, little lighting equipment for general use is shown.

The Gallery of Luminescence contains a number of interesting demonstrations of the Geissler tube and fluorescence, but the important thing to note is the exhibit by Georges and André Claude of luminescent tubes of the neon type, not only for signs and display work, but for ordinary illumination. This system is only just beginning to appear in London, but in Paris the use of twin reddish and greenish discharge tubes bent to form a fantastic skeleton ball or worked into the decorative scheme of the ceiling design is becoming quite normal. The well-known Dupont circuit of cafés (of "*chez Dupont tout est bon*" fame) are all lighted by this method, and their distinctive red furnishing and the appearance of the patrons seem quite normal. In fact, this form of lighting, while it may not give strictly white illumination, does seem to give a bright, cheerful light, which is certainly very suitable for restaurants and certain classes of shop lighting. No doubt the use of such tubular light sources will extend to this country and have a definite effect on English lighting technique in due course.

Street lighting exhibits include an elaborate faceted trough reflector, some 4 ft. wide, said to give absolutely even road surface brightness and also, which are more practical, examples of the new spherical globe type of lantern as used in the exhibition grounds and some of the main boulevards of Paris. These units consist of complete spheres, about 24 in. in diameter, in satin-finished glass (prismatic) made in two halves held together by an equatorial metal band. The lighting control is obtained by special shaped silvered glass interior reflectors. Gas-filled lamps either alone or in conjunction with the mercury type can be accommodated. The lanterns are spigoted on to the top of tall poles like glorified Belisha beacons, or suspended by modernistic projecting arms.

At regular intervals demonstrations of stage lighting are given in a special theatre, and many interesting experiments are made, apparently automatically with almost magical efficiency, to the accompaniment of a popular ten-minute recorded lecture, most clearly reproduced.

This system of recording explanations is also used for other displays in the exhibition, and in the Palace of Light and Electricity there are four cinemas showing talking films on electrical subjects. The exterior lighting effects with outdoor film shows, on what is said to be the largest screen in the world, together with the longest electric spark between poles set 23 ft. apart in the ornamental lake, were not in operation at the time of my visit, but the work was to be completed in time for the longer autumn evenings.

Interior lighting fittings are separately displayed in the Pavilion of Luminaires. Here are shown some very fine examples of ornamental lighting fittings of the characteristic

French type, which are individually designed and sold almost as unique works of art. In addition, samples of industrial and commercial lighting are displayed in model rooms.

The French do not seem to make such general use of opal globes as do the English and Germans, but in the exhibition there were several examples of diffusing units in use with prismatic plates let into the bottom to give a strong downward light. This is optically equivalent to the use of part silvered glass units of the diffusing type, which I have seen in Holland and Germany, and shows a general trend towards light units of greater efficiency than the old standard plain opal globes which have been with us since the introduction of the gasfilled lamp.

Domestic lighting, together with cooking, warming, and water-heating, forms another separate display on the floors of "Electricity in the House." The lighting effects, while good, call for no special mention, but I noticed that the refrigerators included a type with the top cooling portion made in real glazed porcelain. The electric cooker is on standardised French lines, made primarily of sheet metal and steel with one hot plate. The plates are supported on porcelain pillars in the centre of each plate from the top of the oven, so that there is no warming space for plates, etc., and, of course, no grill. This construction does, however, give a very rigid assembly and a hob free from screws or ledges underneath. A wide range of contactors and small circuit-breakers are displayed, ranging from small types for house services to larger patterns for industrial motor control. These types can also be seen in several of the Paris showrooms, and seem to be rapidly becoming popular in place of ordinary fuses, and especially in conjunction with the dished metal boards which are sold ready drilled to carry meter, rotary main switch, and fuses or breaker. The assembly enables the service apparatus to be properly earthed and prevents unauthorised shorting of the meter.

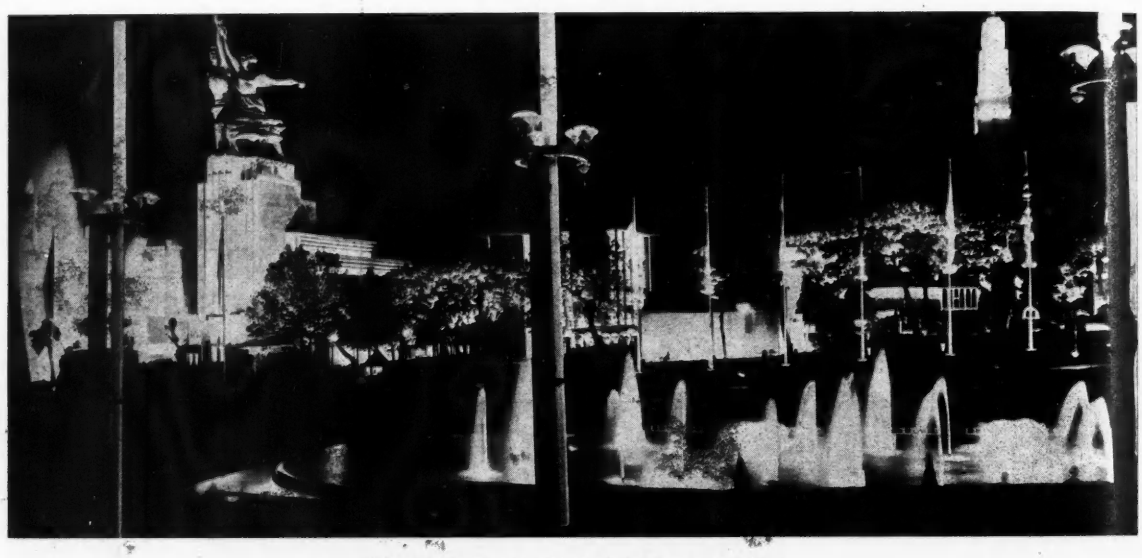
The floodlighting of the exterior of the pavilions follows the usual lines in many cases, but there is a strong tendency to employ cornice or tubular lighting to form a decorative motif which is built into and run right up the building to give an intentionally uneven lighting. This is distinct from the relatively flat effect of separate projectors which are stood around the building to flood the whole façade evenly in the usual English manner. The more artistic French treatment is probably more economical in running costs, and the unique effects possible will probably have an influence on displays in the future in this country.

The Fountains

The luminous fountains on the Seine are a special attraction each evening, several thousand horse-power being dissipated in throwing huge jets in ever-changing shapes and colours, to harmonise with reproduced music. The floating, semi-submerged floodlights are of conventional design, but for the lighting of the new fountains in front of the Trocadero the light is projected through watertight port-holes, the floodlights being underneath the pools in dry cavities. The fountains under the Eiffel Tower are illuminated by special lamps immersed directly in the water, the light control being obtained by silvering the rear half of the glass bulbs.

The lighting of the roadways and avenues in the exhibition is carried out in most instances by the spherical lanterns to which reference has already been made, or by special ornamental fittings of elaborate construction, which in some cases also incorporate public address speakers. On the roadways each side of the new terrace of fountains in front of the Trocadero—the main entrance to the exhibition—it was apparently desired to illuminate the road surface adequately without lighting the surrounding buildings, as this would no doubt interfere with the spectacular effect of the luminous water-jets. This problem has been ingeniously solved by the use of inverted Holophane bowls on steel pillars about three feet high. Internal reflectors are fitted, throwing the light away from the footpaths, and the maximum candle-power is directed downwards on to the street surface. The resultant illumination, while not very even, is sufficiently intense for the safe use of the roadway. There would appear to be possibilities of developing a regular system of street lighting on somewhat similar lines.

This year there are no spelling or studded lamp designs on the Eiffel Tower on the lines of the famous Citroën advertisements of a few years ago, but during the evening fountain and floodlight displays the whole tower is illuminated in a soft red glow from concealed floodlights fitted with colour screens. This forms a wonderful background to the fireworks, which on gala nights are actually fired from the tower itself. In addition to this there are batteries of searchlights which give fan displays in the sky, and under the tower, in the huge arch formed by the first stage, an elaborate coloured design of luminous tubes is attached to the steel work giving a remarkable contrast to the floodlighting of the upper portion of the tower, which looks as though it were self-luminous like the red-hot centre of the exhibition, of which it still remains the outstanding feature after so many years.



Night photograph of the illuminated fountains

Passing the Eiffel Tower, the visitor reaches the Pavilion of Publicity. Here is a really remarkable collection of posters and advertising devices from the world over, by many well-known advertising experts. One of the most remarkable features of this pavilion, of unique metal construction (which incidentally offers a solution to the problem of making an advertisement hoarding of pleasing appearance), is the large, animated spelling sign over the entrance. This is studded with 22,000 lamps in white, green, and red, which enable not only words but simple line drawings to be reproduced in colour and made visible over a wide area.

B.S.S. for Road Traffic Control Signals

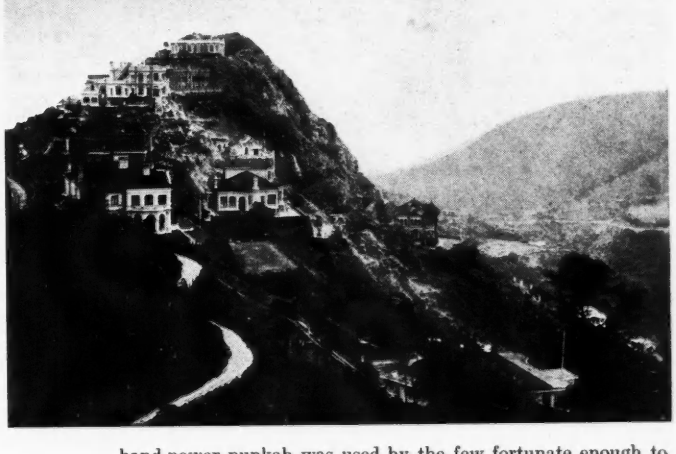
The new edition of British Standard Specification No. 505, "Road Traffic Control (Electric) Light Signals," which has just been issued by the British Standards Institution, revises the clauses dealing with the failure of controllers and the tolerance on performance. It was felt that the variations in timing permitted by the specification, if met with in practice, would result in loss of efficiency in the control of traffic and therefore, at the request of the Minister of Transport, the present revision was undertaken. A revision of the conditions to be observed when Post Office plant is used in association with such signals, which is contained in appendices, was received from the Post Office just in time for inclusion. The Committee is at the present time looking into the question of patchiness and phantom signals. This work will take some time, but it is hoped when it is completed, that some addition can be made to the specification in this respect. Copies of B.S.S. No. 505-1937 may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d., post free.

Electricity and the Atmosphere

By Prof. C. A. Middleton Smith, M.Sc., M.I.Mech.E.

ONE of the latest issues of the ELECTRICAL REVIEW to arrive in the Far East contains some interesting statements made by a prominent electrical contractor, Mr. H. M. Drake, at Llandudno. He discussed problems that are outside technology in its narrow sense and which involve economic, political and social aspects of life. It was most stimulating to one who believes in and has seen in the Far East ample evidence of the great improvements in social conditions effected by the works of engineers to read Mr. Drake's "Speculations on the Future." He included a passing reference to the latest, and possibly one of the greatest, gifts of science to humanity, *viz.*, the provision of a "manufactured" atmosphere in any part of the world. It is not improbable that many readers of this journal have not yet appreciated the close connection between this new and important industry and electrical equipment. Air-conditioning is making rapid progress in South and Central China.

These comments are being written in a room within the tropical belt. Outside the air is at a temperature of 92 deg. F. and the quantity of water vapour in each pound of air (dry) outside is about 200 grains. Inside the room there is only 65 grains of water vapour per pound of (dry) air and the temperature is 78 deg. F. This "manufactured" atmosphere inside the room is obtained by using a small electrically operated machine which resembles a combined gramophone and wireless set. It costs just under £100, delivered in Hongkong. It uses one kWh an hour, which costs five cents. As the room is used for eight hours a day, as an office, it has been found advisable to operate the machine for ten hours a day. The cost of power is thus only about 7½d. a day. The machine is started up two hours before office work begins in order to remove some of the water vapour (and heat) that has accumulated during the previous fourteen hours. The room was not designed for air-conditioning, and in consequence some of the outside air leaks in at all periods of the night and day through windows and the door.



Two views of Hongkong: the prominent white building in the upper picture is the air-conditioned premises of the Hongkong and Shanghai Banking Corporation. The author is Taikoo Professor of Engineering in Hongkong University

The room is small—13 ft.×13 ft.×18 ft. When occupied, normally only by myself, the machine must remove about 500 B.Th.U. per hour (the total heat given out by an average individual) and also the heat due to conduction, &c., and ingress of outside air, due particularly to the opening of the door. The main problems are the removal of heat from the air and the circulation of air by motor-driven fans. If the air temperature in the room is at 80 deg. F., with a relative humidity of 50, the total heat per pound of (dry) air is about 31 B.Th.U. If the outside air is at 90 deg. F., and almost saturated—relative humidity 99—the total heat is about 54 B.Th.U. per pound. So that, if the room is at outside air conditions about 5,000 B.Th.U. must be abstracted to reduce the air within to 80 deg. F. and 50 H.

Records show that in one day a gallon and a half of water vapour was abstracted from the atmosphere in the room during ten hours. It was to be expected that more water vapour would be condensed than if the room had been designed with proper windows and a door to prevent air leakage from outside.

A recent contribution to this journal dealt with the advantages obtained by householders—and electric supply companies—by the comparatively recent introduction of electrically operated domestic refrigerators. You have to live in the tropics to realise the tremendous improvement effected by this type of mechanised cooling, which preserves not only food but health as well.

Air-conditioning in the tropics

About fifteen years ago the first of these machines arrived in Hongkong. The writer, who has no commercial interests in any engineering firm, immediately did his utmost to induce local residents to install refrigerators by giving a public lecture and demonstration, explaining their advantages. Wealthy residents smiled at the suggestion that a capital expenditure of about £80 for a machine was well worth while. Fortunately, two or three wives were more intelligent than their husbands, and, as often happens, woman won the battle for progress. Within two years about 600 refrigerators were installed in Hongkong. The old and insanitary ice-box formerly used to preserve food in the tropics has disappeared from any household that can afford domestic refrigerators. Not only Europeans, but Chinese, now use them. The amount of disease—dysentery, typhoid, &c.—that was conveyed by the careless handling of ice by native servants before it was placed in the ice-box and near to the food, and also by beetles and other insects which found their way inside the wooden box, can be imagined. The engineer has provided an effective guard against these evils.

The domestic refrigerator is a great gift made by engineers to residents in the tropics. It has created a most important new industry and has provided a by no means negligible power load to electricity supply companies. The electrically operated air-conditioning apparatus, however, is a gift of enormously greater magnitude. This new branch of engineering will also create, in the aggregate, a much greater load for electricity supply companies, and will provide very many more valuable orders for manufacturers of electrical apparatus than the refrigerator.

Until mechanisation came to the tropics the hand-power punkah was used by the few fortunate enough to be able to afford it. The electric fan was a great improvement—40,000 are in use in Hongkong to-day. In cases where air motion will produce a cooling effect it is a simple and inexpensive method, but at high temperatures and high humidities the benefit is almost negligible.

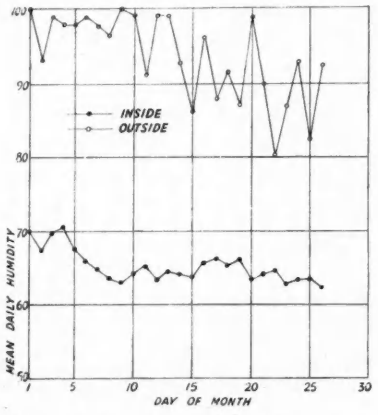
At 85 deg. F. and 99 H. the effect of a fan moving the air at 50 ft. per second is equivalent to a drop in temperature of only about 1.5 deg. F. At 85 deg. F. and 50 H., a fan running at 700 ft. per second makes the air feel 22 deg. F. cooler; but if the air is saturated (100 H.) the fan at that speed makes it feel only 8 deg. F. cooler. But air at 700 ft. per second is about five times the speed of a typhoon, a state of affairs unsuitable for a drawing room! Electric fans, at normal speeds, are almost useless in an atmosphere of high humidity. They have the great disadvantage, when compared with air-conditioning, of causing chills, stirring dust, and moving loose papers from a desk.

It is not so much the reduction in air temperature that creates the power load as the condensation of water vapour; and although that fact does mean considerable expense for equipment and cost of running the plant in a large building—

in Hongkong one installation has created a power load exceeding 600 kW—yet all those who have experienced the advantages of a "manufactured" climate agree that the results more than justify the expenditure.

Market for Electrical Manufacturers

There are several aspects of the commercial problem which are worth serious consideration. We can divide the demand for air-conditioning apparatus into two sections: (1) Its use in certain industries, of which one is the improvement of the atmosphere in automatic telephone exchanges. In Hongkong there are three of these exchanges equipped with motor-driven refrigerators, fans, pumps, &c., which constantly abstract heat and moisture from the atmosphere. There are several others in South China. In the textile mills that are rapidly increasing in number in China air-conditioning plants are installed, providing a useful power load. There are many industries in which it is essential to provide dried and cooled air, and there are others that will benefit from it. We may be sure of an increased demand for this type of apparatus in industry. (2) It offers great advantages (mentioned by Mr. Drake) for human health and comfort, and it increases efficiency, especially in the tropics.



This record shows the difference in humidity between the outside air and that in the air-conditioned Central Telephone Exchange, Hongkong, during April

My own researches on this subject, together with the experience of twenty-five years of residence in a hot and humid climate, and my observations concerning the effect of air conditioning upon human health and energy, make me convinced that within a few years all large office buildings, cinemas, hotels and residential quarters, designed for fairly well-to-do people within the tropics, will be equipped with air-conditioning plants.

It is not only from within the Tropics that this new system will be in demand; already in Shanghai, north of the tropical belt, there are a number of buildings that have been erected in recent years and which are supplied with a manufactured atmosphere. Chinese owners, having experienced an ideal atmosphere in European hotels, etc., in Shanghai, have equipped their buildings with plants to supply dried and cooled air, so that, although the biggest annual power loads will be demanded in the tropics, yet there are other parts of the world where the benefits of a manufactured atmosphere will be appreciated and will increase the electric power load.

Thus electrical manufacturers will benefit not only by the orders for motors and other apparatus needed for the air-conditioning plant, but also because of the increased demand for generating plant to supply power. In addition it is certain that, when these air-drying and cooling plants are in use in the tropics, the increased intellectual energy of those affected by them must lead to an increase in the economic development of tropical lands, which in turn should cause an increased demand for electrical apparatus.

Educating Our Masters

In 1927 I gave a public lecture on air-conditioning in Hongkong. His Excellency the Governor of the Colony presided. There was, at the time, a proposal to build a new Government hospital, with accommodation for about 500 patients. I urged that the building should be fully equipped with air-conditioning plant, pointing out that much space would be saved, for lofty rooms, usual in the tropics, are with this system unnecessary. Thus a very considerable saving in building costs would be made, which could be set off against the cost of equipment needed for a manufactured atmosphere.

The only result of the appeal—reinforced by a prominent local doctor—was a promise that the surgical operating theatres should be air-conditioned. Before the plans were completed His Excellency left the Colony. Subsequently for the sake of economy, the plans for air-conditioning the theatres were cut out. Fortunately, by this time, the doctors were convinced of its absolute necessity and they won the fight for progress. And so to-day the surgeons work under more or less ideal atmospheric conditions. The plant is small—about 60 h.p. seems to be a maximum demand. If the whole building had been equipped the load would probably have reached about 900 h.p.

This is but one example of the results due to an absence of knowledge of the elements of technology in British administrative circles. It surely is reasonable to suggest that this is a subject which demands very careful attention, and even aggressive action, by the senior engineering institutions. In addition, the general public should also be educated. In this problem of making known the advantages of a manufactured atmosphere the branches of industry in Britain that should be most interested are those concerned with (1) electrical equipment, (2) refrigerating plant and its auxiliaries, and (3) fan-makers and ventilating engineers. Is it possible for them to co-operate in propaganda that will benefit themselves and humanity? Is this a matter for action by the F.B.I?

A French Heavy-duty Switch

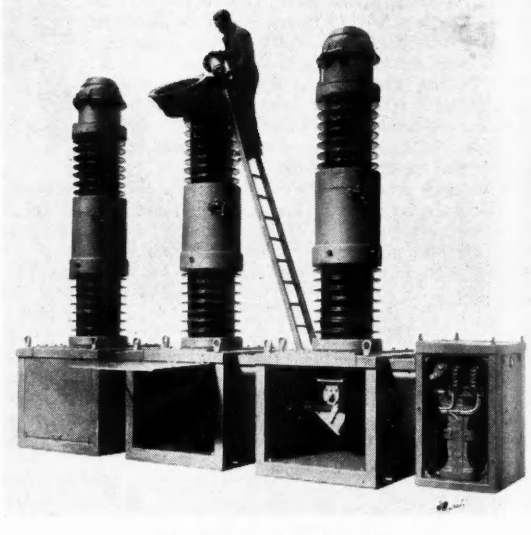
A CIRCUIT-BREAKER for high rupturing capacities, in which oil is injected into the axis of the arc by the force of the arc itself, it being brought out by the Alsthom concern, France, for pressure up to 220 kV.

The switch is in the form of a three-tier column resting on a fabricated casing containing the operating mechanism. This column consists of a lower insulator through which is taken an insulated operating rod, a chamber containing a current transformer the primary of which is the lower moving contact of the switch and an upper insulator containing the main contact. The whole is filled with oil up to a point above the upper contact, leakage being prevented by mercury column packing at the entry of the operating shaft into the mechanism casing.

At the top of the current-transformer chamber is the lower contact in which the contact rod is always engaged. In the upper portion of the highest section is the upper fixed contact and quenching chamber, and at its bottom is an annular block through a cup in the centre of which slides the intermediate contact.

The switch is closed by a servo-motor which turns the operating shaft, causing cams to push the intermediate contact rod upwards through an opening in the base of the rupturing chamber. Springs connected to the cams are under pressure when the breaker is closed.

When the switch trips, the release of these springs causes the rod to fall and a break is made first between the top fixed contact and the intermediate contact and the arc raises the oil pressure. During the further descent of the rod a second arc is formed between the contact rod and intermediate contact and oil is forced through channels in the block (varying in number and form with the voltage and rupturing capacity) across the secondary arc, extinguishing it at first zero passage of current. The oil employed in extinction is always taken from the upper part of the column and on this account is free from impurities.



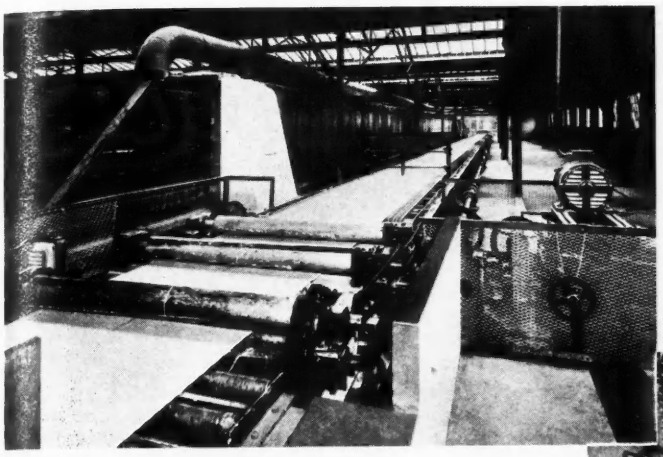
The Alsthom circuit-breaker

Making Plaster Boards

How electric handling assists

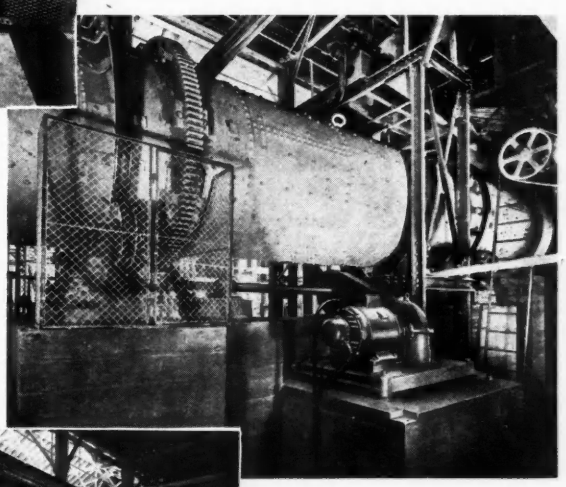
THE raw materials chiefly employed for plaster board are gypsum, paper and water. At the British Plaster Board's new wharf on the Thames a complete ship's unloading and handling plant has therefore been provided capable of unloading gypsum and putting it into storage at the rate of 200 tons per hr. and reclaiming it at a rate of 50 tons per hr.

The gypsum is usually brought in vessels of from 6,000 to 10,000 tons, and is removed from the holds by two level luffing grab cranes. These cranes discharge into two large travelling hoppers, from which belt feeders take the material at 20 ft. per minute to two horizontal belt conveyors travelling at 150 ft. per min.; each of these feeder and conveyor units



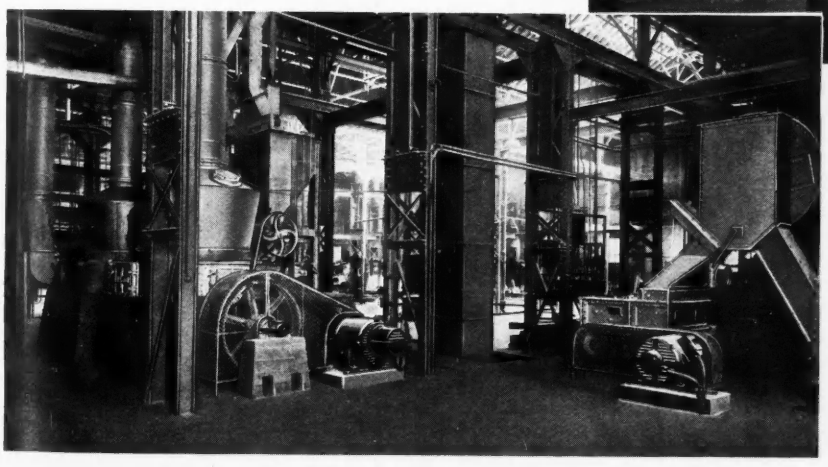
is capable of dealing with a hundred tons of material per hour.

The jetty conveyors discharge on to a 200-ft. inclined belt conveyor, running up the pier. This conveyor has a capacity



From top to bottom:—A 20 h.p. G.E.C. slip-ring motor driving a long belt conveyor and cross feed to the board dryer with one of three Witton-Kramer a.c. solenoids (on the left) operating a cutter, cross-feed and tippler table; two Raymond pulverisers and a Fraser and Chalmers "Pennsylvania" hammer mill; rotary dryer and dryer fan

(at a speed of 300 ft. per min.) of 200 tons per hr., and it is equipped with a Blake Denison automatic belt weighing



machine. From here a chute leads to a 400-ft. main conveyor passing through the factory. Gypsum is discharged on to an inclined conveyor reaching out into the storage ground and equipped with a telescopic chute discharging on to an initial conical storage pile of about 2,500 tons. In order to allow material to be transferred from storage into barges both the main conveyor and the inclined pier conveyor are reversible, an elevator being provided to connect the two conveyors and a boom loading conveyor with a telescopic chute at the pier head.

The main conveyor is fitted with a 40-h.p., 725-r.p.m. motor at one end and a 15-h.p., 700-r.p.m. motor at the other; normally the 40-h.p. motor is used, giving a conveyor belt speed of 300 ft. per min. and a capacity of 200 tons per hr., but when reclaiming the 15-h.p. motor is used, giving a belt speed of 200 ft. per min. and a capacity of 50 tons per hr., special control equipment enabling the conveying belt to be reversed from push-button starters. The tail end of the inclined conveyor over the storage pile is driven (through a clutch) by the head end of the main conveyor. The reclaiming elevator is chain-driven by a 7½-h.p., 945-r.p.m. cowl-cooled squirrel cage motor, while the boom loading conveyor is driven off the tail-end of the inclined pier conveyor. All the conveyors have 24-in. belts carried on troughing idlers.

From the initial conical pile the gypsum is distributed over the storage area by means of a drag scraper consisting of a 2 cu. yd. capacity bucket operated by a rope system from a Sauermann reversing winch driven through a V-rope by a 75-h.p., 960-r.p.m. slip-ring motor. A fan-shaped pile of approximately 50,000 tons capacity is thus formed. Reclaiming is also carried out by this scraper with the ropes reversed, the gypsum being deposited into a ground receiving hopper. From here it is extracted by an apron feeder of heavy construction supplying a single-roll 18 by 24 in. Pennsylvania crusher, which reduces the rock to 2 in. pieces. An elevator lifts the crushed rock on to a picking belt conveyor driven from the elevator, and this conveyor discharges either into the bin or to the reversible main conveyor for reshipment. An 18- by 32-in. Witton-Kramer magnetic separator pulley prevents stray iron from being carried forward to the hammer mill mentioned below.

The rock is withdrawn from the bin by means of an apron feeder and delivered to a scraper conveyor, which carries it into a rotary dryer. After drying, the crushed rock is fed into a 48-in. Pennsylvania hammer mill and then air separated, the fines being removed and sent to the ground material bin. The oversize from the separators is fed to two Raymond pulverisers, and the fines from these are removed by means of two fans; the air circuit is bled through a Visco-Beth dust collector. Four screw conveyors are used to distribute the fines and oversize products to the proper point. Three further conveyors of the drag-link type feed two screw cross conveyors which discharge into two similar underground conveyors, feeding two Fraser & Chalmers bucket elevators running to the top of the silos.

From the silos the material is withdrawn by rotary feeders and screw conveyors and fed into three calcining kettles, which are rotated at 15 r.p.m. by 25-h.p., 705-r.p.m. slip-ring motors driving through V-ropes and chains. The material then passes through further processing plant, for which a number of drag-link conveyors, elevators and worm conveyors are used, the finished plaster being stored in large silos.

For the manufacture of plaster board the plaster is stored in a long bin of triangular section. As the top of this is at a considerably higher level than the screw conveyor bring-

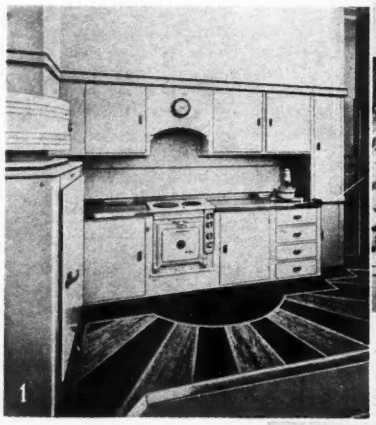
A Large Australian System

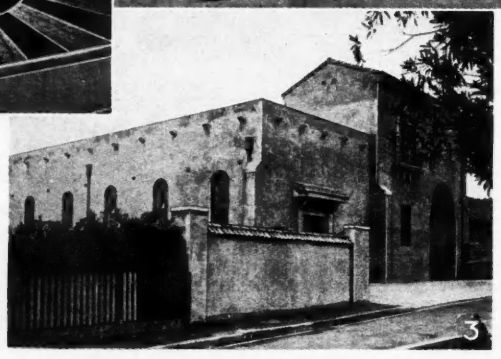
The first year of the Sydney Electricity Department under new control

FROM the beginning of last year the Sydney Electricity Department has been owned and controlled by the Sydney County Council, the five members of which represent thirty-three municipal authorities. The general manager is Mr. H. R. Forbes Mackay, and the chief engineer Mr. R. Vine Hall. A supply is given, direct and in bulk, over an area of 897 square miles having a population of 1,034,000. The assets taken over from the Municipal Council were valued at £21,856,635.

Doubts as to the relationship between the County Council and the management of the undertaking, together with the increase in the work due to the change of control and to additional development work undertaken, made the year a difficult one; nevertheless, the general manager's report, by word and by numerous photographs and charts, conveys a picture of solid progress.

Considerable advancement is recorded in the use of electricity for industrial heating processes, notable applications being to furnaces for ceramic firing and vitreous enamelling, while industrial electric steam generators added a load of over 400 kW. Further exploitation of the industrial heating field is anticipated as a result of a display and demonstration of equipment in the Department's new industrial showroom. The introduction of a flat rate of ¾d. per kWh has also helped in developing the use of electrical air-conditioning plant.





1. A domestic all-electric kitchen in Sydney. 2. The switch and transformer house at the Bunnerong power station. 3. The 33-kV Waverley sub-station

With the extension of the Department's supply to the outlying rural areas, technical assistance has been given to local authorities in their efforts to get all plant changed to electric drive. Notable achievements were the replacement, by 575 h.p. of electric motors, of steam engines in two cold storage works.

The demand for heavy-duty electric cooking equipment showed a marked increase over previous years, the amount of new business, especially in the larger institutions such as hospitals, hotels, bakeries and staff cafés, being the result of several years of concentration on this type of load development.

A Customers' Advisory Service provides advice on problems of lighting, heating and power. The service has as its object not only the promotion of sales, but satisfying customers.

Experience in lighting over the past twelve months indicates a great future for the sale of electricity for this purpose. Many large manufacturing concerns carried out extensive improvements and almost all the large city departmental stores were remodelling their lighting on modern lines. The largest lighting installation carried through during the year was that at a greyhound racing track, amounting to 130 kW in addition to the existing 70 kW of general floodlighting.

The excellent example of an all-electric kitchen in the Council's showroom has assisted in many consumers being persuaded to adopt a similar feature in their houses. Quite a number of residences now have no other form of lighting, heating and power than electricity. Public demonstrations, exhibitions and close co-operation with electrical retailers are stated to be responsible for a noticeable increase in the use of domestic electrical appliances. A Home Management Section was inaugurated to stimulate further utilisation of such appliances by means of individual and mass educational demonstrations.

By the end of last year 86,058 installations in residences which had previously been charged at separate rates for lighting and power had been brought under the single-meter rate, 41,164 because the installations had changed hands or had been added to or altered (in which the new method of charge became compulsory) and the remainder at the request of consumers. There remained 5,842 residences supplied through two meters.

Electricity generated last year totalled 560.0 million kWh, against 520.4 million kWh in 1935, an increase of nearly 8 per cent. Practically all of this was produced at Bunnerong, for the extension of which the County Council last year sanctioned an estimate of £1,861,000 for 100,000 kW of plant.

Sales increased from 428.6 to 461.3 million kWh, allocated as follows:—Bulk supply, 30.6; industrial high-voltage, 52.8; industrial low-voltage, 165.3; commercial, 81.1; domestic, 117.1; and street lighting, 14.4 million kWh. The average kWh sold per consumer (excluding street lighting) was 1,935, against 1,829. For all purposes, the average price obtained, at 1.335d., was lower by 4 per cent.

Gross revenue was £2,625,940 (against £2,555,933), representing 14 per cent. of the total capital expenditure. Expenditure was £1,301,376 (£1,178,700), last year's amount including £172,280 exchange on overseas payments as compared with £100,032 in 1935. After meeting interest charges, &c., there was a balance of £12,221 (£72,110).

Making Plaster Boards (*Continued from previous page*)

ing plaster from the kettles, a Redler conveyor has been installed. This discharges through a gate in the bottom of the casing, thus filling the bin automatically. The bin is emptied by a drag-link conveyor.

After being mixed the plaster is delivered on to the board machine, where it is formed into a continuous sheet, passing over a long belt conveyor and through a large board dryer. The cross feed to the dryer is controlled and a cutter and tippler table are operated by three Witton-Kramer a.c. solenoids. The tippler table enables the boards to enter the dryer at any level required.

All the unloading and handling plant installed (with the exception of the cranes), as well as further handling equipment in the process plant section, was manufactured and supplied by Fraser & Chalmers Engineering Works, in association with the Robins Conveying Belt Co.

About a hundred standard G.E.C. "Witton" motors aggregating 1,400 h.p. are used to drive the handling plant and much of the process plant. Most of the motors above 5 h.p. are slip-ring machines controlled by air-break rotor starters in the small sizes and by oil-immersed rotor starting panels in the large sizes. On the two-motor belt conveyor automatic contactor starting panels are employed with electrical interlocking. The remaining drives are equipped with squirrel-cage motors, those below 5 h.p. being fitted with direct-to-line contactor starters. In most cases protected-type motors are used. W. H. Trace & Son, Birkenhead, installed the whole of the electrical equipment, to operate which an a.c. supply is taken from the 400-V, 3-phase, 50-cycle mains of the Erith Urban District Council.

Progress in Public Lighting

Discussions at the Folkestone Conference

In our last issue we reviewed the three electrical papers which were read at the Folkestone conference of the Association of Public Lighting Engineers last week. These all evoked interesting discussions a report of which appears below.

Experimental Data

IN opening the discussion on the paper by Dr. S. English and Mr. E. Stroud (Holophane, Ltd.), describing "Some Further Experiments in Street Lighting," Mr. G. H. Wilson (G.E.C.) said that the authors' results confirmed that glare from modern street lighting installations was not very severe. Differences in visibility with tungsten, mercury and sodium, were not particularly marked.

Mr. F. C. Smith (Gas Light and Coke Co.), congratulated the authors on having forged for illuminating engineers a tool by which to gauge visibility. The method described was an entirely static one, however. The observer and the disc were both stationary, but that was not the condition obtaining on roads generally. He felt the authors were measuring visual acuity instead of visibility, although he admitted that the difference between the two could not be easily defined. He doubted whether the averaging of results gave accuracy; they should be weighted. The general opinion to-day was that disability glare was of limited importance in well designed installations, but in any case "discomfort" would be more the correct word.

Mr. P. J. Waldram (G.E.C.), referred to the difficulty of defining visibility, even though the authors had measured it. What was measured was the point at which it was impossible to see and in the present state of knowledge one could not obtain from that measure of invisibility a figure to indicate how well one saw.

Mr. R. P. Sayers deprecated drawing conclusions from tests carried out in the United States, where very little had been done with discharge lamps, apart from one or two outstanding installations, whereas England led the world in this form of lighting. He had found that sodium lighting came very close to mercury in visibility, with less expenditure of energy.

Mr. J. F. Colquhoun (Sheffield), said he had obtained uniform lighting on a road with 500-W lamps 150ft. apart and

An excellent example of swimming pool lighting at the "Bath Tub," Alvechurch Road, near Birmingham. Fifty-four "Realux" overhead mounting floodlight projectors are used around the pool, and in the car park and surrounding grounds

25 ft. high. The main beam was initially from 72 to 75 deg. This was altered to 85 deg. without informing a large number of people whose views were sought. All voted for the 85 deg. beam, a view which had to be taken into account, although he did not suggest that that was the correct way to light all streets.

Mr. F. Algar (Dublin), suggested that some mean between British and Continental methods could be generally adopted. He was arranging to undertake experiments on a mile of road with two lines of tramways and carrying heavy traffic. It was 38ft. wide with two pathways 4ft. 9in. wide and there were 25-ft. tramway posts 121ft. apart on both sides. On each of these he intended to put brackets projecting 6ft. and to vary the overhang by swinging the brackets. He proposed to ask for the opinions of users of the road. The lantern selected was a combination of British and Continental design with a cut-off of about 70 deg., and fitted with a silvered mirror reflector with a symmetrical distribution. He hoped to obtain information about the comparative merits of filament discharge lamps. Preliminary investigations showed that in his circumstances filament lamps would be cheaper.

Mr. W. E. Kidner (Barking), showed slides of 250-W and 400-W street-lighting installations with lamps spaced 150ft. apart, the road surface being rough concrete. The borough engineer had wanted 400-W discharge lamps but the lower wattage gave excellent illumination without glare.

Mr. R. C. Cutmore (Wimbledon), remarked upon the need for formulæ to deal with hilly or undulating as well as level roads. Mr. S. J. Patmore (G.E.C.), suggested that if lighting engineers photographed existing bad installations, they would do much towards getting improved lighting everywhere.

Dr. English, replying to the discussion, said it was easier to see a moving than a stationary object. The authors had taken the most difficult line of approach in their static method of measuring visibility, and there had not yet been time to determine how the weighting should be done. He claimed that discomfort glare could be largely eliminated. He hoped that a definition of visibility would be formulated by the Illuminating Engineering Society before the next conference of the Association. He agreed that under some conditions a beam angle of 85 deg. was satisfactory but the glare might nullify its advantages. There was need for planned street lighting and streets should be made available for experiment.

Modern Street Lamps

Opening the discussion on the paper by G. H. Wilson on "The Application of Modern Electric Lamps to Street Lighting," Mr. W. N. C. Clinch (Brighton), expressed the view that more might have been said on the difficulty of illuminating road islands. In many cases a pedestrian might not become visible to the driver of a vehicle at the moment he stepped off. He preferred suspension from buildings to posts as it made a neater and more flexible system.

Dr. S. English (Holophane), disagreed with the author that an increase in visibility always resulted from an improvement in appearance and that the effect of glare on visibility could not be measured at present. He doubted whether the author's technique would help towards getting a bright area over the whole of the roadway because the lamps could not in practice be squeezed together to give the desired results, which was a wide bright street. He considered that the fitting described by the author and installed in Folkestone, was not a true cut-off fitting. It had a silvered reflector and a specular reflector and the brightness of the reflected image was comparable with the brightness of the source. Only the source was cut off—not the brightness.

Mr. R. Maxted (B.T.H.), differed from the author with regard to curb line mounting. The curb line was a most important landmark, and the beam of light should be directed towards it. He suggested 10 deg. from the axis as desirable. The better colour rendering of fluorescent lamps would be more advantageous in industrial applications than at the lower intensities used for street lighting.

Mr. J. F. Colquhoun urged that careful initial planning of street lighting well repaid itself in greater efficiency. The first essential was a good lighting engineer with an adequately staffed and equipped lighting department.

Mr. Wilson, in reply, stated that the object of the technique described in the paper was to secure uniform brightness over wide roads. As to cut-off, he was speaking of the intensity of light reaching the driver's eye. He still felt doubtful whether the glare existing in most street lighting installations really affected the ability to see the sort of objects it was desired to see on the roads.

Mr. F. C. Smith (Gas Light & Coke Co.) paid a tribute to the authors and their company. They had shown the change of conditions from a dry to a wet surface, and although it was possible to be critical in some respects it would not be fair to do so. The authors would agree that all these things needed to be interpreted carefully and they were to be congratulated for having laid down the general principles so clearly.

Mr. E. C. Lennox (N.E.S. Co.) said that films such as those which had been exhibited did more than anything else to enable the lay members of the conference to understand what lighting engineers were aiming at.

Col. O. Striedinger (Bexhill) suggested that the Association with the assistance of the manufacturers, should arrange street-lighting demonstrations in various towns throughout the country to bring home to the ratepayers the fact that it was a wise thing to provide money for good street lighting. Coun-

cillor H. A. Benwell (Bournemouth) suggested that the criterion was to see objects on the road and not to worry so much about lumens and other things.

Mr. J. F. Colquhoun (Sheffield) said the films had made it clear that the scope of the street-lighting engineer would spread from the actual lamps to other considerations such as the kind of road surface and other factors. As regards road surfaces, he appealed to road engineers to co-operate with lighting engineers in order that the surface might be uniform throughout the whole width of the road. In his view, it was the function of municipal councils to bring the matter of good public lighting to the notice of the ratepayers and not that of the officials or the Association.

Mr. Maxted, replying to the discussion, said that magnetic control definitely increased the initial cost, as such, but there were other considerations and on the whole he thought it could be said that it justified itself. On the question of lighting one-way streets only in the one direction, he considered that some illumination in the other direction was also necessary.

The Gasman's Point of View

During the discussions of three papers dealing with street lighting by gas, viz., "High-intensity Gas Lamps," by Mr. G. Keith; "Street Lighting by Gas with Special Reference to the High-Pressure System," by Mr. Dean Chandler; and "Recent Developments in Low-Pressure Gas Street Lighting," by Messrs. F. C. Smith and K. F. Sawyer, Mr. J. N. Waite (city electrical engineer, Hull) deprecated the use of "mean lower hemispherical candle power" as a measure of light output, as it was only a portion of it. The first essential in every street-lighting specification should be the provision of an adequate quantity of light, and this could only be measured as total output in lumens.

The President (Mr. C. I. Winstone) expressed the view that a lamp should be certified as capable of putting so many lumens on the road where the light was wanted.

Mr. W. J. Jones (E.L.M.A. Lighting Service Bureau) said that the public benefited by investigations in both electrical and gas laboratories. Mr. Waite and himself some years ago sent some burners to be tested by the National Physical Laboratory. With a lantern containing three 1,500-c.p. (nominal) high-pressure gas mantles of the long cylindrical type the mean spherical candle power was 1,563 instead of 4,500, and the lumens were 216 per cu. ft. of gas in the lantern. Allowance, of course, had to be made for absorption by the reflectors and the globe. For the block type of mantle lantern, with the burner alone, the light emission per cu. ft. of gas was 276.

Mr. K. F. Sawyer (Gas Light & Coke Co.) disputed the figures quoted by Mr. Jones, as they were, he said, about two-thirds of those which the Gas Light and Coke Co. had been obtaining for ten years from high- and low-pressure lamps. More than 216 lumens per cu. ft. was being obtained even with low-pressure gas.

Mr. Dean Chandler stated that just before the Conference he had had a Supervia lamp tested and the luminous output was 370 lumens per cu. ft. for the lamp and refractor and 380 excluding the refractor.

Mr. A. R. McGibbon wanted a more definite standard of minimum illumination than the Ministry of Transport's reference to a generously planned Class F installation. The aim should be to light as many roads as possible to a reasonable standard rather than to light a few to a very high standard.

Mr. J. M. Waldram was satisfied as to the great importance of the investigations in regard to visibility and appearance and functions of the eye. He believed that the work being done on visibility, &c., would give a clue to what ought to be spent on maintenance. In his view the amount of light leaving the lantern was of secondary importance to the energy consumed and light distribution from the lantern.

Mr. T. A. G. Margary (Wolverhampton) expressed the view that mounting heights to-day were not insufficient for the intensity of the light from the source. With the old flame arc 25-ft. poles were used with greater spacings than at present in order to keep the angle of incidence as large as possible. This he regarded as the right thing to do. His view was that the street lighting engineer was concerned only with the lower hemisphere.

Mr. J. K. Brydges (borough electrical engineer, Eastbourne) said that none of the papers had dealt with the relative advantages of horizontal and vertical light sources. Another point not dealt with concerned poles and their influence on capital cost. The cost of a concrete pole of suitable type was about £6 more than that of a steel pole, but he felt that the lower cost of maintenance would repay the difference.

Mr. B. C. Ossitt (Yorkshire Electric Power Company) said he would like some information on the lighting of gradients and wet roads which had not been dealt with.

Street Lighting Design

Opening the discussion on the paper on "Planned Street Lighting," by Messrs. T. Catten, R. Maxted and G. S. C. Lucas, which was illustrated by two films, Councillor L. F. Biden (Merton and Morden) asked the authors whether they had any information with regard to the magnetic deflector lantern which now seemed to have dropped out of use, and inquired particularly with regard to efficiency, maintenance and initial cost. He suggested that it was more easy to judge street-lighting installations by photographs than by diagrams. Could one-way streets be lighted only in the one direction?

Electricity in Quarries and Metal Mines

DURING 1936 the number of persons employed in quarries more than 20 ft. deep was approximately 74,000. Over 93 million tons of mineral was got from the 5,080 quarries (1,214 using electric power), included in the reports of H.M. Inspectors of Mines and Quarries (Stationery Office, 1s.). This output was 40 per cent. more than in 1930, although the number of man days was then only slightly less, a result that is attributed to growth in mechanisation, since the h.p. of electric motors in use increased during the six years from 97,000 to 152,000, more than 123,000 h.p. of which was represented by a.c. machines.

Accidents caused 76 deaths and 345 serious injuries, and 6,156 other men were disabled for more than three days. No fatal accidents and only two non-fatal accidents were due to electricity. One of the latter was caused by a fitter, when connecting a temporary light by means of a flexible cable, inserting a finger into the lamp-holder and receiving a shock and a burn. The lighting was at 250 V supplied from phase and (earthed) neutral of a 440-V three-phase system. It is recommended that for general lighting in the open air or where the surroundings afford a good conducting path to earth the voltage in quarries should be reduced to 110 V and for portable lights (preferably by a separate transformer) to 25 V or less.

In the other non-fatal accident a hoist attendant received a shock while replacing a fuse carrier in the switchgear controlling his motor. The voltage was 480 on a d.c. system, with mid-point earthed. Unskilled men, the report observes, should not be authorised to open electrical apparatus. Attention is again drawn to the "Memorandum on the Electrical Equipment of Excavating Machinery in Quarries" by the Electrical Inspector of Mines which was included as an appendix to the report for 1935. (This memorandum points out that t.r.s. does not afford adequate protection for trailing cables operated above 250 V and gives a general specification for pliable armoured cables. It also deals with automatic protection, neutral earthing and plug and socket couplings among other matters.) It is stated that the provisions of the memorandum should be regarded as applying to the supply of electricity at medium voltage to a metal barge carrying a pump in a flooded gravel pit. This is sometimes done by means of rubber-sheathed flexible cables without a metallic sheath or screen, but no reliance should be placed on the earthing of a barge hull by contact with water.

In the 262 metalliferous mines working in 1936 the average number employed was just over 12,000. Electricity was in use in 102 mines to the total extent of 36,643 h.p., of which 14,041 h.p. was underground. Pumping below the surface called for the greatest installed capacity, 9,046 h.p., while on the surface air compressors with 8,124 h.p., dressing or cleansing plant with 6,528 h.p., and winding or hoisting machinery with 4,271 h.p. formed the major items of equipment.

Fatal accidents numbered twelve, and there were 1,105 persons disabled for more than three days. No accidents were caused by electricity.

Registered Electrical Contractors

At the last meeting of the Executive Committee of the National Register of Electrical Installation Contractors the following applications for registration were accepted:

R. F. Webb, Southampton.
Chas. Morris & Co., Plymouth.
W. D. Joyce, Liverpool.
Holland & Hannen & Cubitts, Ltd., London, S.W.1.
W. Lee, Atherton.
F. Raworth (Buxton), Ltd., Buxton.
S. & M. Lee, London, E.1.
C. Hutton & Co., Ltd., Woburn Sands.

At the same meeting two applications were declined.

The Engineering and Marine Exhibition

Until October 2nd, the Engineering and Marine Exhibition, which opened at Olympia, London, yesterday (Thursday), will provide visitors with an opportunity of seeing much of the heavier type of electrical equipment now available, in particular for marine use. While the total number of exhibitors (about 600) is approximately twice that at the 1935 exhibition, the proportion having displays of definitely electrical interest (one-sixth) is about the same. Of these, many are participating in a special exhibition of welding equipment. Below we give a brief description of the electrical exhibits.

Aerostyle, Ltd.—Besides paint spraying equipment there is a comprehensive display of compressors of from ¼ to 3 h.p.

A. E. W., Ltd.—Notable features of a complete range of electric furnaces are solid construction, easy replacement of elements and good heat insulation, giving a high thermal efficiency. There are also circuit-breakers specially designed for use with portable electric tools and similar small machines.

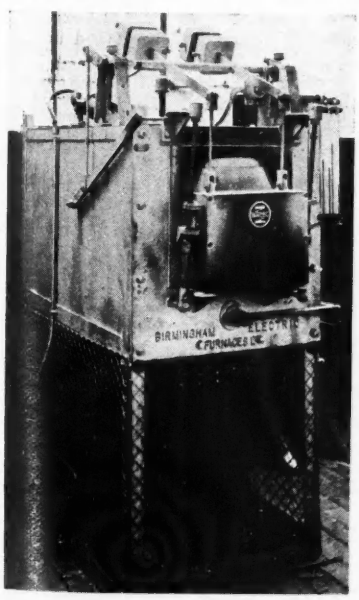
Alkium Storage Batteries, Ltd., are showing representative examples of their batteries.

Allen, W. H., Sons & Co., Ltd., —This company specialises in independent and combined power and pumping units for ships, public service undertakings and industrial purposes. Exhibits include oil engines, steam turbines, steam engines, pumping plant, d.c. generators and motors, control and switchgear. A six-cylinder 582-b.h.p. oil engine is representative of the company's larger machines for powers up to 1,200 b.h.p.; it is supplied with d.c. generators for auxiliary power purposes on board ship. Typical of medium-sized oil engines is a six-cylinder 180-b.h.p. unit coupled to a 120-kW d.c. generator. Among steam-driven exhibits are 80- and 100-kW turbo-generators, a 175-kW steam engine-driven generating set, a turbine-driven main circulating pump of the centrifugal type, and a turbine-driven main circulating pump of the axial flow type. A wide range of d.c. motors includes enclosed ventilated, drip-proof, pipe ventilated and deluge types as well as totally enclosed, with or without self-contained coolers. Control gear comprises drum and automatic type panels for constant and variable speed motors.

Babcock & Wilcox, Ltd.—The company's subsidiary, Erith's Engineering Co., Ltd., is exhibiting a Babcock-Erith-Roe flue type stoker erected in a sectioned flue. Also on view are expansion bends, high-pressure pipe joints, and steam and water valves. Another associate, the Calorizing Corporation of Great Britain, Ltd., shows a number of calorised annealing and heat-treating pots, as well as vessels in "Calmet" alloy. A Clarkson burner-boiler embodies several new features.

Bakelite, Ltd. — "Trefoil" bakelite sheet, rod and tubes are shown, as well as other synthetic resin products, such as varnishes, resins, lacquers and cements.

Birmingham Electric Furnaces, Ltd.—Attention is concentrated on tool room and melting furnaces. The latest "Certain Curtain" controlled atmosphere furnaces (illustrated) for hardening high-speed and alloy steel tools are improved in appearance and are more convenient to use, the atmosphere control system being simpler and more accurately adjusted. "Birlec" high-velocity air-circulation furnaces, as used for tempering and other low-temperature heat-treatment are represented by a model beside which is a charge progress recorder. The "Birlec Detroit" furnace incorporates a new design of shell and a patent automatic rocking control device, giving exceptional flexibility and range of control.



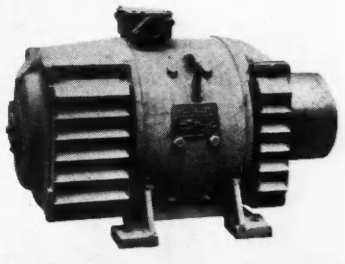
"Certain Curtain" furnace (Birmingham Electric Furnaces, Ltd.)

British Aluminium Co., Ltd.—Aluminium and its light alloys, in ingot and semi-manufactured forms, are to be seen in great variety. A special feature is made of aluminium work in anodised and coloured finish.

British Electric Welding Machines, Ltd. — Electric welding machines of various types form this exhibit.

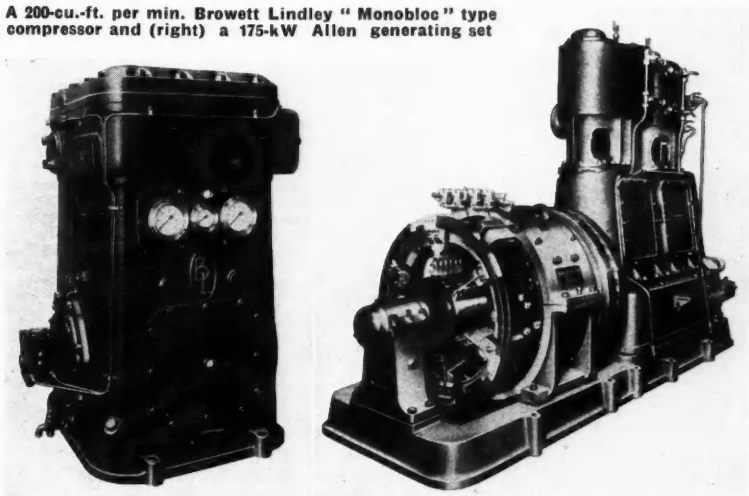
British Oxygen Co., Ltd.—This company's stand is divided into sections devoted to plant and materials for metal-spraying, oxygen cutting machines, and welding and cutting plants.

British Thomson-Houston Co., Ltd.—Electrical equipment of practically every description for use on board ship, in shipyards, engineering workshops and land service generally, is made by this company. An example of turbine machinery, which is available in capacities up to 75,000 kW, consists of a high-speed turbine mounted on a single helical double-reduction gearbox which drives a 10-kW electric generator, also mounted on the gearbox. A 60-kW, 1,500-r.p.m. alternator, shown coupled to an A.E.C. oil engine, is of the type used for driving tugs, pilot cutters, &c., and for auxiliary drives. A combined set comprises a small variable-speed motor with regulator, helical gear unit and slip-ring motor. A "No-lag" power factor correction motor is to be seen in operation, and fractional h.p. motors are represented by various machines including split-phase, capacitor and d.c. types. An important feature of B.T.H. motors is the wide choice of mounting offered. Switchgear and control equipment includes a unit for the control of a large motor-driven blower for marine service, and a Ward Leonard control panel for industrial service. Various examples of contactors and relays are also shown, together with a "Thyratron" voltage control panel. Photo-electric relays include one for the automatic control of illumination according to the variations of daylight intensity. Electric heaters have been developed for various duties, such as process work; heating oils and waxes; heating plating vats, metal pots, solder pots, &c.; press and platen heating; spot heating in bootmaking machinery; stereotype metal pots; and water heating. The "Selsyn" system of remote indication and torque transmission is demonstrated, and two examples of electro-hydraulic thrustors are shown in operation. The display is completed by photographs of important installations, including turbo-electric and Diesel-electric propulsion equipments applied to large liners and cargo vessels. The stand is illuminated by "Mazda" lamps and light tubes.



B.T.H. horizontal d.c. motor for marine service

A 200-cu.-ft. per min. Browett Lindley "Monobloc" type compressor and (right) a 175-kW Allen generating set



Brown, S. G., Ltd.—In addition to headphones, an example is given of an electric steering system for ships.

Brush Electrical Engineering Co., Ltd.—Special features of the 4-cylinder, 312-b.h.p., 350-r.p.m. Diesel oil engine shown are compactness, total enclosure of all working parts, ease of starting, fully forced feed lubrication, minimum vibration, and ease of accessibility.

Cable Makers' Association.—In addition to cables with various forms of insulation for electric lighting and power, there are special types for ship work, protected flexible cables for deck lights, motors, cranes, &c., and telephone cables for ship installations.

C.A.V.-Bosch, Ltd.—Among new electric starting, lighting and distribution equipment for automobiles, &c., are a low voltage exhaust fan and a 12-V searchlight having a range of 400 yards.

Chillcotts, Ltd.—"Vellutex" gasket and jointing material is specially made to withstand intermittent wet and dry conditions and is used largely for electric switchgear, &c.

Chloride Electrical Storage Co., Ltd.—"Keepalite" equipment with "Exide-Ironclad" batteries is especially applicable for ship emergency lighting and steering. Batteries are available for ship telephones, radio, gyro-compasses and clocks.

Consolidated Pneumatic Tool Co., Ltd.—Drilling, screwdriving, grinding, sanding, polishing, &c., can all be done by "Hicycle" and "Little Giant" electric tools.

Crossley Bros., Ltd.—Representative of propulsion and auxiliary units, single- and multi-cylinder Diesel engines include a six-cylinder machine coupled to a 55-kW d.c. generator and a two-cylinder 18-kW, auxiliary generating unit, both shown in operation.

Davey, Paxman & Co. (Colchester), Ltd.—The Paxman medium-speed and Paxman-Ricardo vertical high-speed Diesel engines (illustrated), are typical of the wide range of machines available for marine, industrial, agricultural, traction, lighting, &c., uses.

Davis & Timmins, Ltd.—These specialists in screws, nuts, washers, &c., show terminals, cable sockets, conduit brushes, radio components, &c.

Department of Scientific and Industrial Research.—Exhibits illustrate the work of the Department in regard to engineering, metallurgy, coal, the transport and storage of food, and the fire resistance of structures. The Non-Ferrous Metals Research Association shows an easy and rapid method for testing the thickness of electro-plated finishes. Exhibits have also been provided by the Cast Iron and the British Scientific Instruments Research Associations, and the Industrial Research Council of the Iron and Steel Federation.

Desoutter Bros., Ltd.—A special feature is made of the "Mighty Atom" lightweight portable pneumatic tools.

Dobbie, McInnes, Ltd., make a number of electrically operated navigational and marine instruments.

W. H. Dorman & Co., Ltd.—An engine-driven generating set is one of this company's exhibits.

Electromagnets, Ltd.—Representative types of electro-magnetic separators, lifting magnets, clutches, &c., are displayed.

English Electric Co., Ltd.—Practical demonstrations of arc welding equipment are given. Multi-operator plant shown comprises a transformer and three sizes of welding regulators, while portable equipments (illustrated) include 200-, 300-, 400- and 600-A sizes. Robustly constructed, both the multi-operator and portable equipments are of the oil-immersed self-cooled type and are weatherproof for outdoor service without any further protection. Special units are available for welding materials from 20 to 16 gauge.

Equipment & Engineering Co., Ltd.—Cracks in iron or steel articles can be readily discovered by the "Magnaflux" crack detector.

Kurt Erlach, Ltd.—"Volspray" electrical paint-spraying outfits, air compressors, drills and scaling hammers are shown.

Foster Instrument Co., Ltd., has a complete range of electrical temperature measuring and control apparatus of both indicating and recording types.

Fowler, John, & Co. (Leeds), Ltd.—A 40-kW semi-portable generating set and a 3-kW lighting set are among this company's range of Diesel-driven plant.

Fuller Electrical & Mfg. Co., Ltd.—Demonstrations of all kinds of resistance and arc welding are given.

Gambrell Radio Communications, Ltd. Included among radio equipment displayed are ships' radio-telegraph receivers and transmitters, low-power telephone sets, music and speech relaying equipment, direction finders, auto-alarms and lifeboat apparatus.

F. Gilman (B.S.T.), Ltd., are showing portable flexible tools of all kinds.

Gledhill-Brook Time Recorders, Ltd.—Several new time recording instruments exhibited are fitted with the latest synchronous motor drive.

Gordon, James, & Co., Ltd.—"Mono" combustion recorders, "Igema" distance boiler water level indicator, "Hagan" automatic boiler regulators, steam pressure and temperature control equipment, steam separators, and oil coolers are displayed.

Graham, Alfred & Co., Ltd.—Ships' telephones, watertight bells, automatic fire alarms, &c., are specialities.

Green, E., & Sons, Ltd., are exhibiting all types of fuel economisers.

Grimston Electric Tools, Ltd.—Electric tools shown include drills, grinders, sanders, buffers and sheet metal shears.

Hall, B. J., & Co., Ltd.—Among photo-print room equipment exhibited is the "Hall-Mark" continuous electric copier.

Hall, J. & E., Ltd.—Refrigerating compressors are made for use with various refrigerants, including ammonia, methyl chloride, carbonic anhydride and freon.

Heatly Electric Forgings, Ltd., & Omes, Ltd.—Various electrically upset forgings, ferrous and non-ferrous, demonstrate their advantages over those produced by ordinary methods.

Heayberd, F. C., & Co.—This firm's display concentrates on transformers, battery chargers and rectifier units.

Holden & Hunt, are demonstrating a number of new and improved low-voltage welding machines.

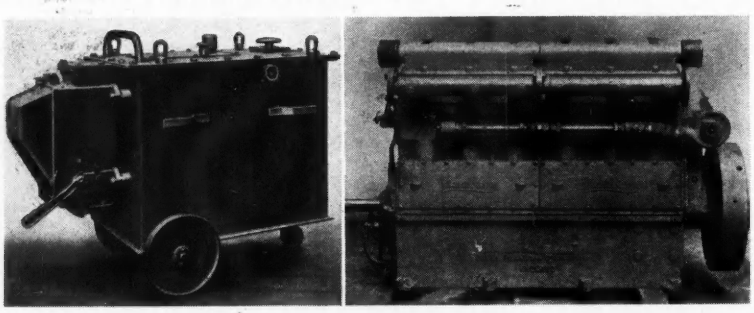
Holmes, J. H., & Co., Ltd.—Electric arc-welding sets are available in both single- and multi-operator types.

Hughes, Henry, & Son, Ltd.—Of special interest are electro-chemically recording echo sounders and the Holmes master magnetic compass.

Hydraulic Coupling & Engineering Co., Ltd.—Electrically operated fans, centrifugal machines, hoists and washing apparatus are represented.

Imperial Chemical Industries, Ltd.—Granular sodium carbonate and fused carbonate blocks are being employed increasingly for the refining of cast-iron and non-ferrous metals.

International Marine Radio Co., Ltd.—This company's exhibit emphasises the world-wide nature of the radio service facilities provided for ships. Installations of the latest design for naval and mercantile use are shown, and a special feature is made of simple radio-telephone installations for coasting and fishing vessels. A rotating loop radio direction finder for trawlers and coastal craft is shown for the first time. There are also depth sounders, motor generators for use in radio communication, and equipment for the automatic transmission and reception of alarm signals.



English Electric 300-A portable welder incorporating a combination fused switch, and a Davey Paxman six-cylinder "RW" type Diesel engine

Intex Engineering Co., Ltd., has in operation a travelling electric hoist block of enclosed construction, with oil-immersed controller and gears. X-ray photographs show how "Flexo" cables are designed to withstand strain.

Invicta Electrodes, Ltd.—Demonstrations are given of welding plant and electrodes.

Kelvin, Bottomley & Baird, Ltd., exhibit "Kelvite" navigational, scientific and engineering equipment.

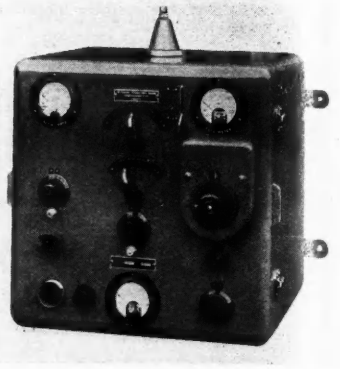
Kent, George, Ltd.—Instruments for the measurement and control of liquids, temperature and boiler plant combustion are among the items on view.

Kryn & Lahy (1928), Ltd.—Steel castings, many in "Stronger Steel," cover a wide variety of industries and include locomotive castings, traction motor frames and other components of electrical machinery. Several examples of "Coborn" portable engines are shown.

Lindley, J. Browett, (1931), Ltd.—A standard 750 cu. ft. per min., two-stage, double-acting, motor-driven air compressor and a 90-b.h.p. "central valve" type steam engine are arranged to rotate slowly so that the working parts can be seen in operation through glass doors. Shown for the first time is a 200 cu. ft. per min. "Monobloc" type compressor (illustrated), one of a new range of machines that will be in full production in two or three months' time.

Lyon, Arthur, & Co., are showing three sizes of petrol generating sets.

Marconi International Marine Communication Co., Ltd.—A display of the latest radio apparatus includes a new type of all-wave receiver, developed to overcome interference from powerful broadcasting stations. Two new designs of auto-alarm apparatus are shown work-



Marconi telegraph and telephone transmitter for small craft

ing, and various types of radio direction finder, receiver and aerial are available. Over 2,000 "Echometer" sounding devices, of which three types are shown, have now been installed. A demonstration of the magneto-striction sounding device is given.

Martindale Electric Co., Ltd.—The exhibits include "Commstones" for grinding commutators and slip-rings, mica undercutters, portable blowers, etchers and maintenance equipment.

Mawdsley's, Ltd.—In addition to welding sets there are various types of a.c. and d.c. motors, constant current generators, and dynamometers.

Mek-Elek Engineering, Ltd.—"Mekelite" industrial lighting units have been specially designed for local lighting in works and offices. The epicyclic geared joints give an unusually wide range of adjustment and special attention has been given to ease of installation and maintenance. There are floor, bench, wall and ceiling mounting types, portable units and others for fixing direct to machines with a special sud-proof housing to enclose the lampholder for use on machine tools. Those for use on ships have a frictional control to prevent them swinging. "Mekelite" units can be supplied either for mains voltage or with transformers for 12 V.

Mercer, T. & F.—A replica of the dual chronometer clock and fully automatic control panel supplied to the "Queen Mary" is of particular interest.

Metropolitan-Vickers Electrical Co., Ltd.—Among a wide selection of welding products is a high-frequency rotary a.c. set for thin plate welding.

Mond Nickel Co., Ltd.—Advantages and applications of nickel alloys are demonstrated by means of animated models, dioramas and stereoscopic pictures.

Mosers, Ltd., are exhibiting "Wolf," "Black and Decker" and "Grimston" electric tools.

Murex Welding Processes, Ltd.—A special display is made of electrodes, many of which are new or improved, and attention is drawn to the use of heavy currents and of large-gauge electrodes for fabricating mild steel articles. A model of a welding manipulator manufactured by Davy & United Engineering Co., Ltd., is on view.

National Time Recorder Co., Ltd.—Electric recorders controlled by a master clock are produced for a.c. and d.c.

Non-Ferrous Die Casting Co., Ltd.—Specimens of products include die castings in aluminium alloys, brass, bronze, white metal, zinc alloys, &c.

Norris, Henty & Gardners, Ltd.—Oil-engine driven power units are supplied up to 400 b.h.p. A specimen 5-kW marine auxiliary generating and compressing set incorporates a single-

cylinder cold-starting engine developing 9½ h.p. at 1,000 r.p.m.

Ozonair, Ltd.—A complete ozone-producing plant for theatres, cinemas, public buildings, offices, &c., is shown in operation. Also a combined heating and ventilating unit for factories, and "Ozonair" pure-air plant, including portable apparatus

C. A. Parsons & Co., Ltd.—Exhibits include a model of a 50,000 kW, 1,500 r.p.m., turbo-alternator; a shaft for a 30,000 kW, 3,000 r.p.m. tandem turbine; a vertical extraction pump; a totally enclosed steam jet air ejector; a transformer for rural use; on-load voltage regulating equipment for transformers; samples of turbine blading; conductors and insulating materials; searchlights and reflectors.

Petbow, Ltd., produces electric welding apparatus of various outputs.

Petters, Ltd.—Included among a comprehensive selection of oil and petrol engines and electric generating sets, is a new 16-b.h.p. single-cylinder harmonic induction engine direct coupled to an electric generator. There are also a 5-kW, fully automatic Diesel electric set, a 1-kW electric generating set for use in small houses, bungalows, yachts, &c., and an auxiliary compressor set with a 15-b.h.p. atomic Diesel engine.

Philips Lamps, Ltd.—Among electric welding apparatus demonstrated is a special plant developed for welding sheet metal as thin as 22 s.w.g. Portable and stationary industrial X-ray equipment, rectifiers, &c., are also featured.

Pilkington Bros., Ltd. — "Armour Plate" and toughened glass is now being used for electric cooker doors, electric fires, floodlights and insulators.

Power Contracts (Batwin), Ltd., are showing electric motors of from 1/100 h.p. to 3 h.p., electric clocks, sign flashers and radio valves.

Quasi-Arc Co., Ltd.—Many new applications of electric welding are to be seen.

Radiovisor Parent, Ltd.—Light-actuated apparatus is employed for such purposes as lighting control, smoke indication and alarm, counting, turbidity indication and flame failure control.

Ransomes, Sims & Jefferies, Ltd.—Two of the company's latest electric trucks are exhibited, together with a standard driving unit and elevating gear mechanism.

Rapid Magnetting Machine Co., Ltd.—An addition to the company's range of electro-magnetic separators, lifting magnets, clutches, chucks and other magnetic appliances is the "Multi" self-cleaning chute magnetic separator.

Rawlplug Co., Ltd.—Demonstrations are given of the company's various well-known fixing devices. Attention is also directed to its plastic wood, heatless solder, soldering irons and other tools.

Reavell & Co., Ltd.—Air compressors represent the various types available for marine and land use.

Renold & Coventry Chain Co., Ltd.—Apart from a selection of power transmission accessories there is a working model of a mechanical handling plant for loose materials.

Rockweld, Ltd., manufacturers under licence in this country various electrodes produced on the Continent.

Ross, Courtney & Co., Ltd.—All kinds of turned and pressed metal parts are supplied for the electrical industry.

Russell, Newbery & Co.—A 9-b.h.p., single-cylinder Diesel engine is shown coupled to a 5-kW generator.

Ruston & Hornsby, Ltd.—Marine auxiliaries are represented by a 100-kW set, with a five-cylinder 150-b.h.p. oil engine as prime mover, and a number of smaller units. A 19-kW emergency set, comprising a radiator cooled, three-cylinder 30-b.h.p. engine driving a generator, is becoming increasingly popular for emergency and port lighting.

Selson Machine Tool Co., Ltd.—Wire welding machines, manufactured by the Micro Products Co., of Chicago, makers of "Microweld" machines with dial indicating annealing attachment, form the principal exhibit. This company has just taken over the agency for Davis spark testing equipment.

Siemens Bros. & Co., Ltd.—The ships' electrical equipment exhibited includes telegraphs, rudder, revolution, navigation light, and "look-out" indicators, navigational telephones, distance thermometers, thermo-electric pyrometers, torsion meters, radio equipments, auto-alarm devices, direction finders, and automatic telephone exchanges embodying the "Neophone."

Silentbloc, Ltd., is showing flexible bearings, anti-vibration mountings, cushion-drive couplings, propeller-shaft bearings, and instrument mountings.

Simmonds Aerocessories, Ltd.—Engineering accessories include nuts, clips, navigational instruments, jointing compounds and flexible transmission systems.

Soag Machine Tools, Ltd.—Electric welders of all types form this exhibit.

Sterne, L., & Co., Ltd., have a display of compressors and air conditioners.

Stokes Appliances, Ltd.—Besides the well-known table cooker there is a new electric plate and food warmer.

Streamline Filters, Ltd., have a full range of filters for reconditioning used oils.

Sun-Vic Controls, Ltd.—The "Sun-Vic Hotwire" vacuum switch is particularly suitable for use with thermostats and other contact instruments. Accurate control of temperature is possible with the company's adjustable thermostat apparatus, while an energy regulator can be used in cases where it is difficult or expensive to fit thermostats.

Synchronome Co., Ltd., demonstrates its system of time-keeping for ships.

Telephone Mfg. Co., Ltd.—Noiseproof and loud-speaking marine telephones are the principal exhibits.

Tellus Super Vacuum Cleaner, Ltd.—Demonstrations are given of the company's bagless cleaner, the motor of which is detachable for spraying, &c.

Ward, Thos. W., Ltd., specialises in raw foundry materials and requisites.

Welding Supplies, Ltd.—The characteristics of the various grades of "O.K." electrodes are shown by means of actual welding demonstrations.

Westinghouse Brake & Signal Co., Ltd.—Metal rectifiers for all purposes, including electro-plating, battery charging, change-over and general industrial work, &c., are shown. A demonstration of a rectifier for plating vats shows the excellent current regulation obtainable and low running costs. Uses in connection with broadcasting stations, cable testing, &c., are depicted by photographs.

Wild-Barfield Electric Furnaces, Ltd.—Small muffle furnaces for laboratories and works are represented by horizontal rectangular and oval sectioned muffles and tube and vertical furnaces. Suitable for heat treatment below 700 deg. C. vertical furnaces with forced air circulation are shown in two sizes, one of which is fitted with a charge progress recorder. For temperatures up to 1,150 deg. C. there is a horizontal batch-type furnace with patented "Tubular-Hairpin" heating elements. High-speed steel hardening furnaces and the "Vickers Pyramid" hardness testing machine are also on view. The larger furnaces of the company and its associated concern, G.W.B. Electric Furnames, Ltd., are illustrated by pictures.

Windsor Axia Fans, Ltd.—Circulating and extraction fans can be supplied to meet various requirements.

Industrial Applications of Science

Subjects discussed at the B.A. meeting

Among the matters which received attention during the annual meeting of the British Association at Nottingham were permeability testing, with particular reference to transformer steels, gas absorption in the annealing of low-carbon irons and the application of electrical vibrations in television. Abstracts of these proceedings appear below.

A.c. Permeability Testing

IN the Engineering Section Dr. L. G. A. Sims, of the British Standards Institution, read a paper on the a.c. method in permeability testing. He said that at the 1936 meeting of the Association the committee of the Engineering Section considered a report which he submitted upon the case for a standard specification relating to the incremental magnetisation of sheet steels. Subsequently the B.S.I. Technical Committee on Transformer Steels formed a drafting sub-committee. The sub-committee's work had been based upon a questionnaire circulated in 1935-36 throughout this country, Europe and America. A decision had been arrived at that measurements of incremental permeability should, if possible, be made by an a.c. method rather than by the ballistic method.

The a.c. method offered automatically the advantages of a simultaneous determination of losses and of the possible adaptation of apparatus to the higher frequencies of tele-communication technique where a ballistic test would appear inapplicable. In order to comply with practical operating conditions it also seemed desirable: (a) To specify tests at a.c. inductions and d.c. polarisations with which pronounced wave-form distortion was associated; (b) to adopt sinusoidal a.c. induction as the basis of test; (c) to maintain condition (b) throughout the full range of (a); (d) to measure the full amplitude of the distorted magnetising force resulting from (a), (b) and (c) in order, as nearly as possible, to ascertain the fundamental behaviour of the test sample; and (e) ultimately to test simple (probably strip) specimens in a permeameter. Whilst ring specimens remained of the utmost importance in laboratory research, their punching and winding offered serious disadvantages in routine works testing. A permeameter suitable for a.c. testing has consequently become the subject of experimental research.

The major obstacles to realising the above ideals were briefly those due to (a) incidental circuit resistances, and (b) circuit reactance not associated with the flux in the iron sample. Both these were much more serious in incremental than in "non-incremental" tests, due to the lower permeabilities which resulted from polarisation in the former case, and these difficulties were accentuated at low frequencies.

Authoritative recommendations upon testing methods could be considered as certain, but any more detailed statement would be premature. A section of the sub-committee's task which would become urgent in the near future was the definition of distortion factor. Close consideration would also have to be given by the committee to the problem of acceptable symbols and nomenclature. Without an agreed scheme it was safe to say that ambiguity was difficult to avoid in incremental magnetic measurements.

Problems in Annealing

In Section A (Mathematical and Physical Sciences) Mr. A. Brookes read a paper on "Some Gas Absorption Problems in the Annealing of Low Carbon Irons." Electric furnaces were, he said, readily adaptable to the utilisation of gaseous atmospheres in heated chambers, the main object being to prevent oxidation. He described an installation in which electrically heated bell furnaces with "cracked ammonia" gas were installed to anneal low-carbon magnetic iron when low coercive force and high permeability were required.

The iron was almost pure ferrite, and due to machining and

other processes had a Brinell hardness of from 120 to 200. The iron parts were packed in nickel-chrome alloy baskets, within a sealed bell-shaped container (through which the nitrogen-hydrogen gas was passed continuously), heated to 950 deg. C., and then cooled slowly. Although the 400 lb. charges were treated under practically identical conditions, certain batches became brittle after annealing, a 20 deg. bend fracturing the metal which exhibited a coarsely crystalline structure, whereas it should be capable of being folded flat upon itself through 360 deg.

Experiment confirmed a theory that this brittleness was due mainly, to hydrogen penetration causing the iron carbide at the crystal faces to be reduced to spongy iron.

Faulty parts were reannealed in an atmosphere formed by burning town's gas, which restored them completely. By regulating the proportion of burnt town's gas to hydrogen-nitrogen mixture the original carbon content (0.02 to 0.03 per cent.) of the steel was maintained.

The refractory of newly built electric furnaces exuded moisture, and this with the water vapour which might be present in the decomposed ammonia when mixed with the gases would cause oxidation of the iron parts annealed. In burned coal gas containing 5 per cent. CO even large proportions of moisture vapour did not induce brittleness. The use of calcium chloride for drying the gas had the advantage that free ammonia was absorbed. Equilibrium might also be established by introducing hydrocarbon gas or carbon monoxide.

The amount of free ammonia in the decomposed gas should be only about 0.03 per cent., but if temperatures were not accurately controlled or if the gas rate was too great the figure might reach 0.7 per cent. by volume, causing the annealed iron parts to give definite indications of nitriding.

Vibrations and Television

Professor E. W. Marchant presented a paper on "Electrical Vibrations and their Applications in Television." In this the author described methods used for producing electrical vibrations. The dynatron oscillator and the principle of the thyratron control "time base" for a cathode-ray oscillograph or television receiver were illustrated by water models. The capacity of the condenser in the circuit giving the time base was represented by a small pivoted vessel so arranged that when filled it tilted over and emptied itself. The flow of water into the vessel was kept constant, as was the electric current which charges the condenser used in the time base, and the grid bias of the thyratron was represented by a pivoted arm which prevented the tilting over of the vessel until it had filled to a definite level. The height to which the vessel must fill before tilting over was controlled by a weight on the pivoted arm.

The paper also explained the arrangements for focusing the photo-electric image so as to produce the necessary photo-electric currents for television transmission, reference being also made to the need for using short waves and the corresponding limit of distance to which television transmissions could be sent.

Battersea Power Station Extensions

AS we have reported in previous issues approvals have been given by the Electricity Commissioners and the Central Electricity Board for the extensions to the Battersea power station of the London Power Company. The work involves the commencement of the second half of the station.

The first half, which is now complete, has a total capacity of 243,000 kW, comprising two 69,000-kW and one 105,000-kW, three-cylinder, 1,500-r.p.m. turbo-alternators. They are supplied with steam from nine retort stoker-fired boilers, the first six having a m.c.r. of 312,000 lb. per hr. and the last three of 375,000 lb. per hr. The plant operates on the straight regenerative cycle with steam at about 600 lb. per sq. in., 850 deg. F. The feed is heated to 340 deg. F. by means of multi-stage bled-steam feed-water heaters and the condenser vacuum is about 29.1 in. (bar. 30 in.).

During 1936 the station generated 1,050,147,270 kWh, with a thermal efficiency of 29.14 per cent. on kWh generated and 27.63 per cent. on kWh sent out, the highest figure yet attained in a steam station in this country. The thermal efficiency of 28.59 per cent. (kWh generated) in the previous year was also a record at that time, a notable advance on the previous station built by the company, Deptford West, which headed the list in 1931 with a thermal efficiency of 24 per cent. (kWh generated).

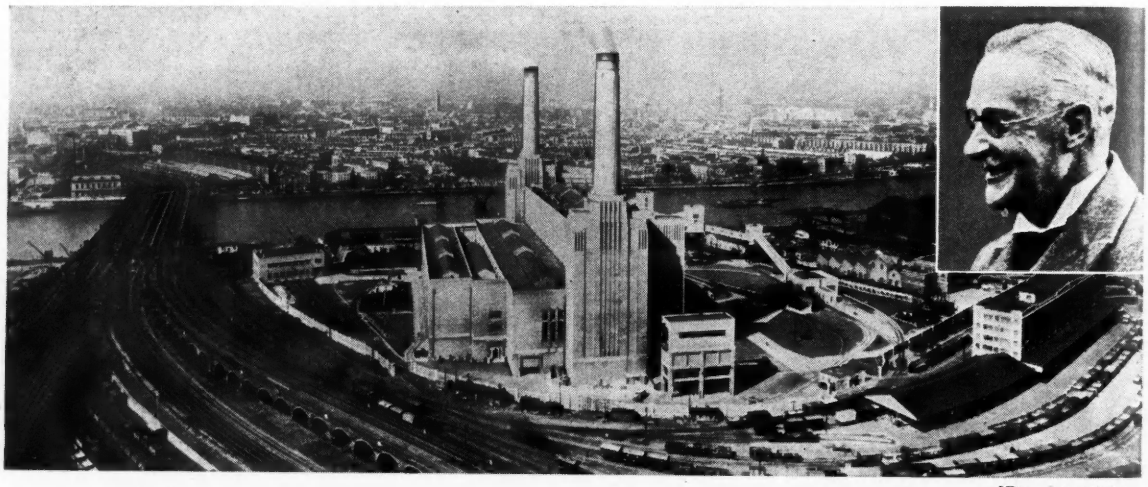
In the design of the second half of the Battersea station high efficiency of generation has been the main object, in view of the rising costs of fuel, but such aspects as reliability, low repairs and maintenance costs, ease of operation, space occupied and capital cost have also influenced the decision to adopt the straight regenerative steam cycle with retort stoker-fired boilers with considerably increased steam pressures and temperatures. Steam conditions at the turbine stop valve will be 1,350 lb. per sq. in. and 950 deg. F., the feed water being heated in six stages by bled steam to 400 deg. F.

The plant will consist of a 100,000-kW turbo-alternator built in two sections. The h.p. section, comprising a 16,000-kW single-cylinder unit, will run at 3,000 r.p.m., taking steam at 1,350 lb. per sq. in., 950 deg. F., and exhausting at 600 lb. per sq. in. The l.p. section, comprising an 84,000-kW two-cylinder unit, will run at 1,500 r.p.m. and will take steam at 600 lb. per sq. in., exhausting to a condenser vacuum of 29.1 in. (bar. 30 in.); it will be arranged for bled steam feed-water heaters. The turbine will drive a 78,000-kW main and 6,000-kW house alternator.

Intermediate steam receivers will be provided between the h.p. exhaust and the l.p. inlet, which will be cross-connected to the existing 600 lb. per sq. in. mains in the first half of the station, so that either h.p. or l.p. units can be operated independently in conjunction with the existing plant. The condenser will be of the two-pass type (cooling surface 70,000 sq. ft.), using about 3,200,000 gal. of circulating water per hour.

The closed-feed system is to be similar to that provided on the first two sets in the existing half of the station. The feed-water heaters will be of the vertical hairpin-bend tube type, the four h.p. heaters being designed for 1,700 lb. per sq. in. on the water side and being arranged on the discharge side of the boiler feed pumps. This arrangement reduces the power absorbed by the feed pumps which are called upon to operate only at the lower temperature of about 212 deg. F.

(Continued at foot of next page)



[Elec. Rev. photo.

Battersea station as it now is. The extension will add a symmetrical half back to back with the existing building. (Inset, Sir Leonard Pearce, C.B.E., D.Sc., engineer-in-chief of the London Power Company)

Electricity in Coal Mines

A further 77,000 h.p. of motors installed during 1936-37

LAST year saw another large increase in the use of electricity in mines. Out of 2,080 mines at work, 1,332 were electrified to some extent. In these 50,368 motors were running, of which 27,325 were below ground. The annual Report of H.M. Electrical Inspector of Mines (Stationery Office, 2s.) shows that the capacity of motors installed at June 30th had increased by over 77,000 h.p. to 2,087,000 h.p., of which 53 per cent. was underground, where the greatest advance was noticed (52,000 h.p.).

Of the last-named amount 17,300 h.p. was due to pumping, 12,200 h.p. to haulage, 11,800 h.p. to coal cutting and 6,900 h.p. to coal-conveying. Above ground coal-cleaning accounted for 8,100 h.p. of the 25,000 h.p. added. An increase in the capacity of d.c. motors of 5.68 per cent. is recorded (compared with a decrease of 2.45 per cent. in 1935) and of a.c. motors 3.48 per cent. Nevertheless, the latter still formed over 83 per cent. of the aggregate horse-power.

There was an increase of 9½ million tons in the quantity of mineral cut by electrical machines out of a total increase of 12½ million tons got by machine mining. The number of electric coal cutters was 162 more than in the previous year, bringing the total to 4,797 in the 864 mines using machines. The proportion of machine-cut mineral to the total of 235 million tons got was 53.5 per cent., of which 71.4 per cent. was cut by electricity.

A substantial addition was also made to the number of electrically driven conveyors and loaders, a further 493 machines making the total 4,385 in the 637 mines in which mechanical conveyance was employed. About 46 per cent. of the 235 million tons raised was dealt with mechanically, electricity being responsible for 66 million tons.

Electrical Accidents

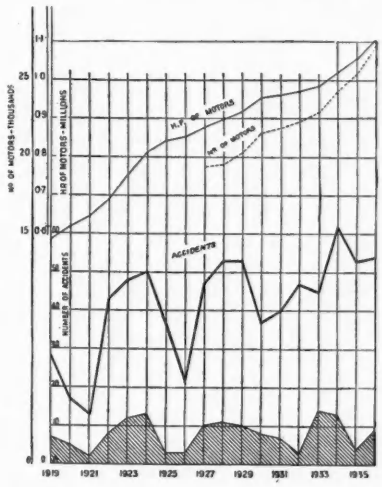
Ten accidents involved loss of life, six causing the same number of deaths from shock. Three other accidents, definitely attributable to ignitions of fire damp by electricity, were responsible for the loss of six lives. In the remaining case the explosion at Wharncliffe Woodmoor Colliery, which resulted in the deaths of fifty-eight men, the balance of evidence indicated electricity as the probable cause, viz., the illegal switching on of a small d.c. loader motor by an electrician after he had removed the cover from the commutator at which sparking occurred.

A table setting out the number of deaths from shock and the h.p. of motors installed in each of the last twenty-five years shows that in 1912, when only 317,000 h.p. of motors was installed, there were seven deaths from shock. Three curves are included as appendices relating the extent of electrification with the number of accidents over eighteen years.

Forty-six non-fatal accidents involved injury to fifty-one persons. In addition, three persons were injured in two of the fatal ignition accidents. All but one of the injuries were due to shock or arc burns in forty-five accidents, the other case being the result of an ignition of fire-damp. A second ignition of fire-damp and twelve fires below ground, which caused no injury, were reported.

Defects in design or unsuitability of apparatus were responsible for one fatal and two non-fatal accidents; installation maintenance for one and seventeen respectively; misuse, negligence and ignorance for three and thirty-four; organisation and lack of equipment for two and nine; and unforeseeable causes for three and six.

Flexible cables and plugs were involved in three of the fatal and twenty-two of the non-fatal accidents. Switchgear and fuses, which accounted for one fatal accident, formed the biggest item in the injuries group with twenty-six, while armoured cable was concerned in one fatal and five non-fatal occurrences and overhead lines and unarmoured cable with one in the first category and two in the second. Motors and transformers were associated with two of the fatal and three of the non-fatal accidents, coal cutters with two of the fatal type and lighting accessories with one lesser injury.



Reportable accidents and dangerous occurrences below ground due to the use of electricity. (Fatal accidents shown by shaded area, non-fatal accidents superimposed)

Damage to Cables

Regarding fire risks with cables, the Cable Makers' Association, at the instance of the Electrical Inspector, has undertaken to investigate the subject experimentally, particularly in respect of the value of non-inflammable coverings. During the past ten years flexible trailing cables and plugs have accounted for 44.3 per cent. of the fatal and 40 per cent. of the non-fatal accidents. An instance is given of a non-fatal accident on a three-phase system with earthed neutral using a collectively screened cable of Continental make; this could probably have been prevented by the use of leakage protection. Two photographs are given showing the effect of "cork-screwing" on a screened trailing cable.

In one fatal accident due to burns from an arc a stonemason using a pneumatic pick to remove brickwork from an outside wall pierced a 2,750-V double-wire armoured cable. All switches controlling the circuit tripped and the cable insulator and wrapping were not set on fire. The position of the cable was well known; it had been run only two months before. In another case a coal-cutting machine man when coiling a wet 625-V trailing cable was killed by a shock through both hands. A puncture at a spot where the cable had been repaired revealed itself only on a high-voltage test. Screened cables were afterwards substituted and an improved routine of inspection was established.

A coal cutter became alive due to a breakdown in the insulation of the 550-V star-delta drum-type starter. The fuses in the gate-end switch box were not blown, indicating that the earthing conductor had become detached previously. Automatic earth continuity protection coupled with leakage protection is mentioned as offering insurance against such accidents, otherwise frequent inspection is called for. The organisation at the Ashington group of collieries is commended. Here every trailing cable (56,000 yd. is in use) is examined in situ daily and insulation and conductivity tests are made each fortnight. Also cables are brought to the repair shops once in three months for overhaul. Screened cables and leakage protection are employed. No fatal accident with trailing cables has occurred at these collieries during the last nineteen years.

Another fatal shock from a coal cutter was due to damage to a trailing cable as a result of carelessness, but it could have been prevented if screened cable with leakage protection had been used. This implies earthing of the neutral point of the 500-V three-phase system, which was operated with an insulated neutral point.

Two deaths occurred from ignition of fire-damp by the use of a coal cutter, the jack-head plate of which had become detached, leaving an opening into the control-switch chamber. Flameproof enclosure of the switch should have been completed independently of the attachment of the jack-head.

Three men were fatally burned in consequence of an ignition

Battersea Power Station Extensions (*Continued from previous page*)

Two boilers, each capable of generating 500,000 lb. per hour of steam at about 1,420 lb. per sq. in. and 965 deg. F. from feed at 400 deg. F., are to be installed ultimately and one will be ordered shortly. The boilers will be fired by retort stokers, and a notable feature of the design will be a very large combustion chamber, giving a low heat release rate. This chamber will be completely covered with water-cooled walls. Each boiler will be provided with a two-stage superheater arranged for accurate superheat control. The unit will be complete with economisers and air heaters and duplicate forced, induced and secondary air fans.

The flue gas washing plant will follow the principles found so successful in the first half of the station, but minor modifications will be embodied, based on experience obtained over the last few years.

The extension will be constructed in accordance with the designs and under the general direction of Sir Leonard Pearce, C.B.E., D.Sc., engineer-in-chief of the London Power Company. Externally, the architectural features will follow the lines of the first half of the station. There will be ultimately two additional towers and chimneys, situated at the north-east and south-east corners of the site, respectively. Internally, the new buildings will embody certain features—not present in the first half—which are calculated to improve the general effect.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Engineering Status

The excellent comments of "Thrice Chartered" in your last issue find an echo in my own experience. I was admitted to an engineering college of high standing after having passed the entrance exam. in the usual manner. I shall never forget the first lectures which I attended on mathematics. The lecturer started off by writing down the numbers 1, 2, 3, 4, etc., on the blackboard, and I thought that this seemed a queer sort of kindergarten way of getting down to the business of teaching engineering.

But that did not last for long. Before I knew where I was we were all engaged on the apparently fruitless task of chasing the square root of minus one! It was only after considerable thought that it dawned upon my poor intellect that this was, is and always will be, an imaginary quantity; and in this age of reason, when we have to earn our livings, to think that we should waste so much valuable time on so futile an expedition!

There was a good deal of that kind of thing, and I consider that the sooner we get down to teaching only that which is of real practical value, the better shall we be able to turn out engineers who can call themselves engineers. This "x-" chasing business is all very well in its way, but it is very much overdone.

September 10th. A.M.I.C.E.

Lampholder Troubles

The renewal of burnt-out lamps housed in the modern bakelite lampholder is difficult and often impossible. Usually an attempt on the part of the lady of the house to remove a spent lamp simply results in the cement joint between bulb and lamp cap giving way, which more often than not means the bringing in of male assistance to remove the lamp.

This trouble may seem a small point to supply engineers, but I am convinced from personal observation, that in the aggregate it results in the loss of quite a lot of load. Low consumption portable appliances fitted with the usual lampholder adaptor, for example, become a source of anxiety to the housewife, if she has a lot of trouble in removing a conveniently placed lamp before she can plug-in.

Of course, it might be argued that this is all to the good, as she ought to have socket outlets. But many wired houses have no such circuit, or at the best, only two socket outlets downstairs and one on the first floor, and all very inconveniently placed. The net result in many cases is that the housewife, the main buyer, when confronted with a new shade, the possibility of trying out a larger lamp, or purchasing say, a vacuum cleaner, is at least sub-consciously and often consciously discouraged from making a change by memory of an unpleasant struggle to renew a lamp.

Three factors would seem responsible for the tight fitting of the lamp. High solder on the contact pieces, too powerful plunger springs and faulty bayonet catch. The height of solder on the contacts does not vary greatly and is certainly no higher than in the days of the all-metal lampholder. Again, the position of the pegs on the lamp cap checked against a very old lamp, appear to be unaltered, and in any case the trouble is certainly not confined to one make of lamp. Powerful plunger springs plus the present "one-piece" method of construction, whereby inserting a lamp lifts the plungers and terminals carrying the flex, certainly make it no easier to change a lamp, but this method of construction is such a vast improvement over the old light metal plungers, that it would be a mistake to alter it. Furthermore, by no means do all bakelite lampholders employ this principle, yet these all jam the lamp to a lesser or greater degree.

In my opinion the present difficulty in fitting and removing a lamp from a bakelite lampholder lies in the shape and disposition of the "J" slots. They seem to be placed slightly higher than in the old all-brass lampholder and the inside loop of the "J" appears somewhat steeper, consequently a much greater effort is required to fit or remove the lamp. At any rate the passage of a small file a few times over the loop of the "J" slots makes a great difference to the ease in fitting or removing a lamp. That this should be so points to the need for a check-up on the part of the lampholder manufacturers, and a concerted effort to overcome a very real trouble.

September 10th. SALESMAN.

Examinations for Electricians

The enrolment for evening classes is now in progress, and I think it an opportune moment to correct an impression that is held by some wiremen. That is, that the City and Guilds examination in electrical installation work is unpractical. Such, to a small extent, was true in the past, but recent papers have improved, and this year the examination was above reproach. The two papers set for Course B contained sixteen questions:—One sketch, one drawing, four on the I.E.E. regulations, one on testing, one on telephones, one on wiring practice, three on motors, and four on circuit calculations. Exception will be taken by many to the telephone question, but is this fair, as only twelve of the sixteen questions may be answered, and there are a number of wiremen most interested in this class of work?

I hope that this letter will induce many young and old installation men to join classes in this subject, as the examinations are just what is wanted and the teaching is practical. The National Register made the first step in marking high-grade contractors, and the next should be the registration of wiremen. F. PEAKE SEXTON.

London, S.W.11, *September 8th.* *Battersea Polytechnic.*

Lighting and Road Surface

A remark made in your article on the street lighting demonstrations at Folkestone causes me considerable surprise. You state that: "It is a little unfortunate that the road surface has been recently laid and has not yet acquired that polish which affords maximum visibility."

In the interests of the motoring public, it is surely the aim of engineers and surveyors to produce a road surface which continues matt throughout its life, thus retaining non-skid properties. This being so, I submit that any lighting installation which depends on road polish for visibility is almost useless. H. G. B.

September 13th.

Concrete Lamp Standards

With reference to the article "The Street Lighting Demonstrations," appearing in your September 10th issue, the last paragraph with regard to concrete lamp columns should read "Could do more by way of artistic design," meaning that they could get more artistic designs with the concrete than can be obtained with the steel.

CONCRETE UTILITIES, LTD.,

Ware, Herts, *September 14th.* C. A. Marques.

[We regret that a "no" slipped into the sentence to which Mr. Marques refers. Some very graceful designs of concrete lamp standards have been produced, one of which was illustrated in the article in question.—EDS. ELEC. REV.]

Electricity in Coal Mines (*Continued from previous page*)

of gas caused by arcing at a defective joint in a five-core screened trailing cable. A fused break was found in one of the conductors and the arc (which bored a hole through the insulation and rubber sheath) was due to load-current passing at the point of fracture and not to short-circuit. The joint had been carefully made, but the workman had not understood that local rigidity was likely to cause breakdown. Where more than one conductor of such a cable has to be jointed the joints must be widely spaced. Particulars of thirteen non-fatal accidents are also given in the Report. Most of these might have happened with any high-voltage installations, but two which were due to fire-damp explosions were of a special kind. In one case two men were burned by ignition of fire-damp due to arcing at a damaged place on a flexible t.r.s. 440-V cable. Probably this was caused by an arc, though shot-firing is a possible alternative. It is emphasised that when cables have to be taken down and rehung after road repairs or ripping, current should not be switched on again until after examination and testing by an electrician.

In the second instance ignition followed a short-circuit in the open end of a plug coupling attached to a live trailing cable which was being carried. The plug was dropped and the arc ignited the gas. The plug was a skeleton variety of the B.S. model in which the insulating block is replaced by separate sleeves for each tubular contact with a disc at the nose. The insulation was carbonised but fusion of the metal tubes was slight. This design has been certified officially as flameproof, but the certificate applies only to the junction between plug and socket when the coupling has been made. Failure of the insulation may have been brought about by the entry of mud.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Sewing Machine Light Unit

A local lighting unit for use with industrial sewing machines is the latest development by the ELECTRIC DEPOT, LTD., Pritchett Street, Aston, Birmingham, 6.

It enables the light to be directed, without glare, exactly where required in the area around the needle. The arms are so proportioned that no part of the fitting need impede the passage of the material through the machine, while the arrangement of the universal joints enables the fitting to be swung up for needle threading or forward for any handwork which is to be done.

The "E.D.L." sewing machine lamp

In addition to the fact that the fitting is arranged for mounting by the side of, and not on, the machine, vibration is minimised by the provision of ample friction area at the joints, while the lamp is protected by the damping effect of the arms.

Each fitting is finished in black enamel, and is complete with vitreous enamelled reflector, lampholder and a switch in the base.

A Small Cooker

The latest cooker to be introduced by BERKELEY & YOUNG, LTD., Tyseley, Birmingham, is the "Nippy 8," which is capable of meeting the requirements of from two to four people.

The oven measures 12¼ in. by 11¼ in. by 10 in. and underneath there is a large enclosed warming plate. A 1,800-W griller-boiler serves both the hob and the oven, and in addition there is a small circular simmering plate.

The cooker is constructed of steel and fine grain iron castings. The hob, cooker front and door are treated with acid resisting vitreous enamel in mottled grey and white and the oven interior is also enamelled. The oven elements are of the plug-in type.

The "Nippy 8" cooker

Washing Machine Developments

DRAKE & GORHAM WHOLESALE, LTD., 77, Long Acre, London, W.C.2, announce the introduction of a new washing machine known as the "Moreasy." This is really a washboiler fitted with a hand operated agitator and wringer, the lid and agitator being hinged to swing clear so as to provide easy access to the clothes.

The inner pan, which has a capacity of ten gallons, is fitted with a 3.3-kW element, mica insulated and copper sheathed, of the strip type on a flat base pan. It can, however, be supplied with a "Manchester" circulating heater with a stronger 10½ gal. dished pan. An alternative table top enables the washer to be used as a pastry table when not in use.

An unusual addition to washboiler equipment is a tub supplied with a stand fitted with castors, enabling it to be used as a trolley between the sink and washer, or in the yard when hanging clothes out to dry.

The company's washboilers will in future be fitted with a new safety cut-out working on the actual water level in the pan. Connected by a metal tube to the bottom of the pan is a small collapsible chamber housed in a brass tube. This is inflated when there is 3 gal. of water in the pan and collapses when there is only one. It operates through a simple lever and a bakelite enclosed 20-A mercury switch of the type used in prepayment meters. The switches on the boiler are "dead" until the prescribed amount of water has been poured into the pan. The volume or weight of the clothes does not affect the operation of the cut-out.

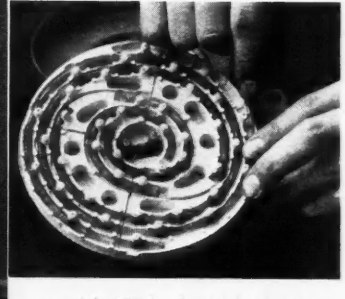
The "Manchester" circulating washboiler has been further improved and a new 8-gal. model introduced for small flats.

Electric Cookers

Developments in the electric cooking field announced by MOFFATS, LTD., Blackburn, include three new cookers and the "Cookquick" boiling plate.

The 44M employs a 2,000 W boiler-griller and an 8 in. 1,650-W "Cookquick" boiling plate, or if desired an 1,800-W cast embedded type. The 12 in. by 13 in. by 11 in. oven is heated by 500-W top and 1,000-W bottom elements. The grilling compartment is 17½ in. by 14 in. by 6 in., the size of the griller being 8 in. by 9½ in.

The Moffat 42M cooker showing the grill pan and roasting tin, and (right) the "Cookquick" plate



A larger model, the 42M, has an oven 14 in. by 13 in. by 13 in., while the 43M has an extra 6½ in. diameter boiling plate and a 14 in. by 16 in. by 13 in. oven heated by 2¼ kW elements. In each case the standard equipment includes an oven heat indicator, an aluminium grilling and roasting pan, a selector oven switch, fuses (with spare), two oven racks, baking tray and drip tray. An "extra" is "Thermo-Matic" oven heat control, giving thermostatic oven temperature control over a range of from 250 to 550 deg. F.

The cookers are available in the following finishes:—French grey and white with body sides in dark blue or white, or colour combinations and two-tone ivory, ivory and green, ivory and crimson, and ivory and black, in each case porcelain enamel throughout.

The "Cookquick" rapid boiling plate does not require special machined-bottom cooking utensils, any reasonably flat pan or kettle giving satisfactory results, and it can be fitted with a special new heat resisting alloy cover.

Apart from the 8-in. size, a 6½-in. model is now being made. This is of similar design to the larger plate, and the loading is 750 W (optionally 850 W). The coil length is 56 in., there being almost 60 per cent more wire than in a cast enclosed type plate of the same size. The added wire results in lower coil temperatures without affecting the heat production of the whole unit.

The new type is fitted with special sectional porcelain pieces.

D

A Bakelite Hair Dryer

Travellers in particular will welcome the all-bakelite hair dryer which SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38-39, Upper Thames Street, London, E.C.4, are supplying in a case (also made of bakelite) fitted with mirror and comb and with a stand for the dryer when in use, thus leaving the hands free.

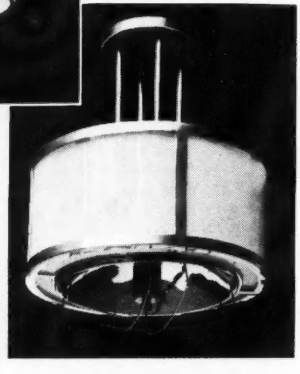
Siemens bakelite hair dryer

Easily accessible switches operating the blower (50 W) and the heater (450 W), can be operated by one hand. A universal adapter allows the dryer to be used either from a lamp socket or from a plug point. The apparatus, which is suitable for a.c. or d.c., may be obtained without the case.

to support the wire, enabling the wire to be notched into position, not threaded. Replacing the element when necessary is thus only a few minutes' job. Another feature of the plate is that the side terminals are away from the heat.

Combined Lighting and Heating Apparatus

Two new "Heatlite" combined lighting and heating fittings of the pendant type are being introduced by HARCOURTS, LTD., Stanhope House, Kean Street, London, W.C.2. A 1-kW "Torribar" tubular element fitted round the edge provides the heat source for the larger cone-shaped model, which has a maximum diameter of nearly 2 ft. and is arranged to take three filament lamps. The glass diffusing panel is let into an attractive and



Two new "Heatlite" fittings

substantially constructed metal mount, which, like the three ceiling rods and a decorative knot at the bottom, is finished in chromium plate.

For use particularly in bathrooms, etc., the smaller model incorporates a 400-W bowl type heater, well protected by guards, and is designed to accommodate four ordinary lamps. The lighting fitting portion, which is totally enclosed, is cylindrical with glass sides and borders underneath round the heater. Four chromium-plated rods arranged vertically from the ceiling plate are used for suspension.

Electric Iron

PREMIER ELECTRIC HEATERS, LTD., Keeley Street, Birmingham, have introduced a low-priced iron known as the "Jewel." The new iron is constructed on precisely similar lines to the more expensive models and is backed by the company's customary five years' guarantee. It has both back and thumb rests and a well-made connector with an efficient cord grip, but, naturally, it cannot have quite the same refinements in finish. Ordinary hexagonal nuts, for example, are used instead of ones with rounded edges for fixing on the handle, and this is made out of wood instead of the moulded rubber usually employed by the company.

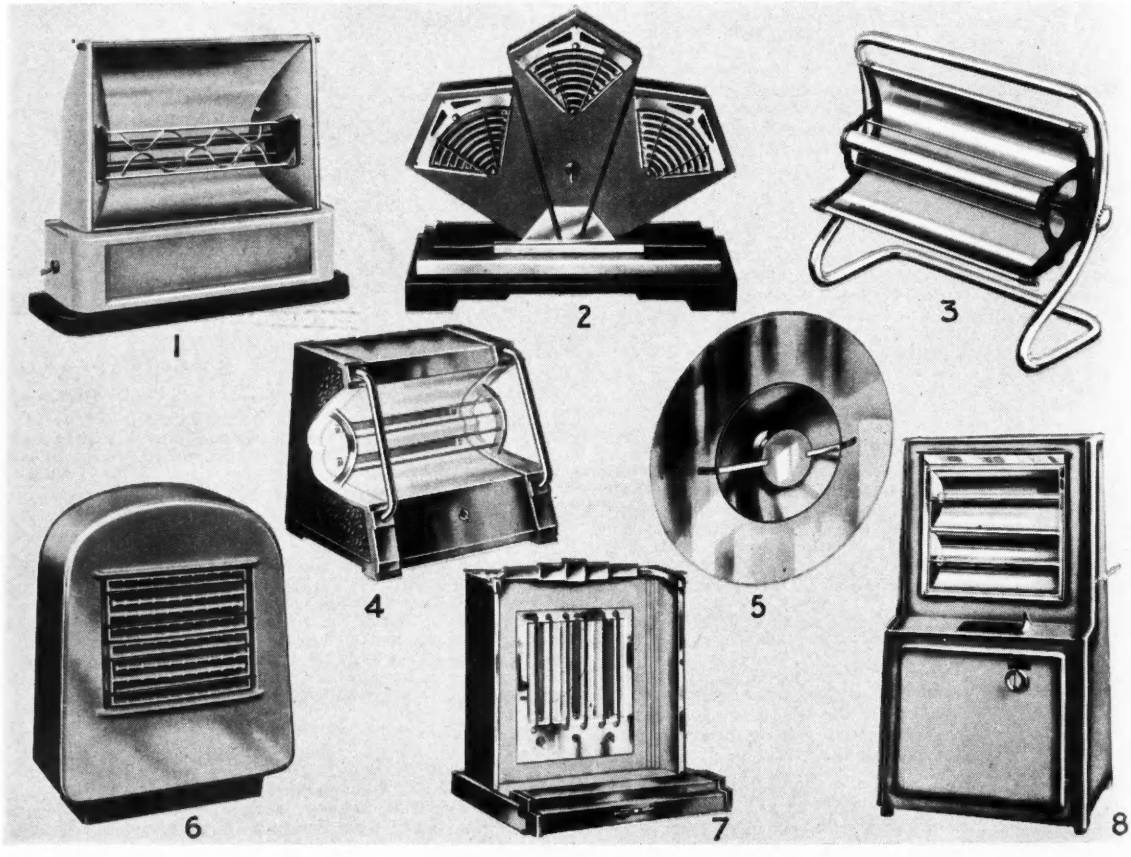
The Premier "Jewel" iron

Made in a 5-lb. size only, the new iron has a loading of 450 W. The standard finish is nickel plating, but a chromium plated model is available.

Motorised Valves

A new range of motorised valves, introduced by the RHEOSTATIC CO., LTD., Slough, employs a motor embodying many new features and improvements, including increased power, silent running, and self-aligning and self-oiling bearings. The electrical circuit has been designed so that the motor can be stalled for an indefinite period without being damaged. A selector switch is incorporated, this being geared to the low-speed shaft and arranged to switch off the motor when it has responded to the demands of the remote switch or thermostat.

An additional make-and-break switch is incorporated for more complete heating schemes, or, alternatively, this can be used for signalling the position of the motor by means of indicating lamps. The valves can be supplied for standard a.c. and d.c. voltages up to 250, and will include hot-water butterfly valves from 1¼ in. to 6 in. and steam valves from ¾ in. to 2 in.



Examples of the New Season's Electric Fires illustrating the Trend of Design

1. Simplex "Newglow," 2½ kW with hearth-glow effect. 2. Dowsing 2¼-kW triangular "Hogarth." 3. Graham Farish tubular model. 4. Revo 2-kW "Ritz." 5. Hotpoint "Liberty" 750-W inset reflector fire. 6. Hotpoint 2-kW portable "Archway." 7. Revo 3-kW floodlit "Imperial." 8. G.E.C. 2-kW slot-meter fire

Electrical Trade with Argentina

Factors affecting the situation

IN the course of his address as chairman of the Argentine Local Centre of the Institution of Electrical Engineers, Mr. H. C. Siddeley reviewed the world economic situation as it affected Argentine trade—particularly the electrical import trade.

He maintained that most of the present difficulties were due to the artificial situation created by the policy of all countries of increasing their tariffs in a mistaken effort to make themselves independent of outside suppliers. Argentina was dependent upon her export surplus to enable her to meet her foreign debt services and have a balance to finance imports. Thus British importers had a direct interest in seeing that Argentina had a high value of exports and maintained the value of the peso.

Electrical development in Argentina had been favoured by little gas competition and the unrestricted use of overhead distribution. Unfortunately the absence of technical control by the Federal Government had led to a complete isolation of the supply into separate units incapable of introducing combined systems, where this course might have proved profitable. The influence of an expert body in determining the system of tariffs might have had beneficial results, as at present such questions were settled by non-technical bodies who had great difficulty in understanding the results of load factor, maximum demand, diversity factors, &c., on the question of costs.

Buenos Aires consumed approximately two-thirds of the electricity generated by supply undertakings in Argentina, and had therefore a great influence on the sale of electrical appliances. Conditions favoured their use and Mr. Siddeley looked forward to a time when a tariff would be adopted which would encourage the increased use of domestic appliances. The climatic conditions favoured this also. The working hours of the people were favourable to the electrification of all transport; the morning and evening peaks were more spread out, and the custom of the two hours' lunch interval encouraged further travelling as it enabled many workers to return home for lunch.

Import Duties

Notwithstanding the fact that there was little local manufacturing of electrical plant or materials, customs duties were at such a high level as to be detrimental to the use of electricity and therefore affected the import business. Much of the electrical materials imported were subject to a high rate of duty, and as much of these were essential to other classes of manufacturers, the consequent increased cost became a direct charge on all Argentine industries.

Generally speaking, great improvements had taken place recently in street lighting owing to the enormous increase in the number and speed of vehicles. There had never been any competition by gas for street lighting, such as had given an impetus to invention in Great Britain. The South Americans had less opportunity of seeing other methods owing to their distance from Europe and the United States and in street lighting especially an actual sight of new methods was necessary to their adoption.

There was a tendency for Argentina to follow the general practice of other countries to make itself more self-contained. There was, however, no iron, coal and other materials necessary for the establishment of an engineering manufacturing industry. It seemed, therefore, a sounder policy to increase her production of grain and meat, &c., which she could do so cheaply and exchange these for her engineering requirements from countries better able to produce them.

There was, however, another phase of manufacturing which was more economically justified and which was being adopted in this and many other countries; this was the partial manufacture locally of certain portions of apparatus, importing other parts and assembling the whole locally. Many electrical appliances were fitted in cast-iron or sheet-steel cases which were both bulky and heavy, involving high rates of duties corresponding to electrical materials. Such parts of refrigerators, cookers and others were already produced in Argentina, resulting in a reduced cost of the whole, although the more costly parts were imported.

Manufacturers might with advantage take such factors into consideration in their future designs by making it easier to divide the production in this way, as such a course often enabled them to retain a market which might otherwise be lost to local enterprise.

Standardisation

In the past there had been a lack of standardisation of materials imported by or produced in Argentina. Some of the Government Departments had their own separate specifications, whilst others required materials to comply with V.D.E., B.E.S.A. or A.I.E.E. specifications. As these differed in many respects, the materials offered might differ considerably in their characteristics. Great Britain had suffered in this as the B.S.I. often called for conditions more severe than other countries' standards, leading to higher prices. A serious effort was being made by the authorities to formulate definite Argentine standards.

As Argentina must depend for many years on foreign countries for electrical materials, the I.R.A.M., the body controlling this work, was disposed to formulate standards based on those of other countries. As regards electrical materials this work was assisted by the reliable work already done by the I.E.C. The Argentine branch of this Commission (the I.E.E.) had encouraged this work from the start, and had become members of the I.R.A.M. It was important to future British trade that the British point of view should be well represented so that the standards when formulated should not be unfavourable to our British standards.

Mr. Siddeley appealed for the assistance of the younger members of the Institution as representatives on the various committees on which the Institution was entitled to be represented in order that British practice and standards might be fully discussed and our reasons for their original adoption by the B.S.I. explained. The B.S.I. had established an Argentine branch to assist this work and to help the various representatives on the local panels.

The British Share

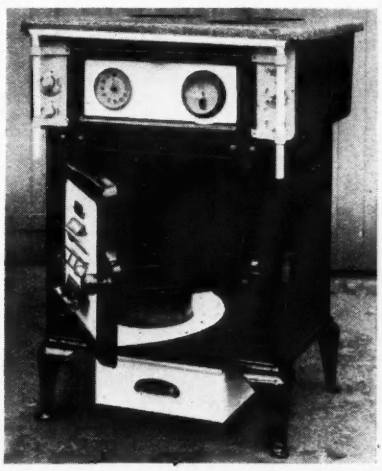
The speaker concluded with an analysis of British electrical import business during the last nine years. He said that the high water mark of British imports was reached in 1928-30 on account of important railway electrification work carried out during these years.

Both the total imports and those of Great Britain fell considerably in 1931 and continued on the down grade until 1933, when both reached their lowest figures. Since then there had been a continuous increase both in the total imports and in the proportion supplied by Great Britain.

It was evident that British trade had improved during the last few years, notwithstanding a decided lessening of the orders which the electrical industry formerly received from the British-owned railways. With the advent of comparative prosperity the electrical industry might look forward to a renewal of their patronage.

A Multi-purpose Cooker

WITH a view to economising space in his kitchenette where there is little available room for electrical appliances, Mr. W. J. Worthington, of Dorking, has incorporated in a standard cooker a number of additional fittings usually found as separate items. On the oven door he has fixed an electric fire, the guard for which can be drawn forward to enable bread to be toasted. On the hot-cupboard door are a towel rail and timing devices for boiling eggs and cooking food. Attached to the interior of the oven door and adjustable as to height is a platform, the purpose of which is to enable foodstuffs to be inserted and withdrawn, thus obviating the need for the housewife or cook to put her hands into the heated oven; the platform also facilitates the basting of joints. A similar platform is permanently fixed to the top of the oven door, mainly in order to minimise loss of heat when the door is opened to inspect food in course of being cooked; it also protects the user from discomfort due to escaping hot air under the same conditions. The drawer seen in the illustration may be used as a receptacle for small kitchen requisites or for such duties as warming butter and keeping salt dry.



A "multum in parvo" cooker

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

Lamp Manufacture in the I.F.S.

At the annual meeting of Solus, Teoranta, held recently in Dublin, Mr. J. J. Walsh (chairman) said that the company was equipped to supply every type of lamp, and, notwithstanding the fact that it had had to contend with millions of " dumped " lamps since beginning operations, its sales for 1935-36 were not unsubstantial. Sales for 1936-37 were double those of the previous year, while sales to date indicated that the favourable upward trend should again double those for the year under review. They were now able, at the termination of the second year's trading, to give an initial return to the shareholders. The net profits for the year ended June 30th were £10,992, and it was proposed to pay a dividend at the rate of 5 per cent., less income-tax, on the paid-up ordinary share capital of the company.

Part of the extension of J. A. Crabtree & Co.'s Walsall works nearing completion

Design and Industries Association Conference

The Design and Industries Association is holding its first week-end conference on September 24th-26th at the De La Warr Pavilion, Bexhill, when the state of design in Britain to-day, the probable trend of the modern movement, and the development of the D.I.A. policy will be discussed. The chairman of the association is Mr. A. B. Read, director of design, of Troughton & Young, Ltd., and the association has the support of such electrical authorities as the General Electric Co., Ltd., the British Thomson-Houston Co., Ltd., the Metropolitan-Vickers Electrical Co., Ltd., and the Central Electricity Board.

Marking of Porcelain Goods

Under a new French Customs regulation, an indication of the full name of the country of origin, without abbreviation, will be required on and after October 11th next, on all porcelain and ceramic parts for electrical purposes imported into France.

Trolley-buses for Australia

The Associated Equipment Co., Ltd., has received an order for ten 661T, four-wheel, A.E.C.-English Electric trolley buses from the Adelaide Tramways Trust. The new vehicles will be built partly at the A.E.C. factory at Southall and partly at the works of the A.E.C. (Australia) Pty., Ltd.

Alleged Contravention of Factory Act

A case was heard at Accrington on September 8th arising out of an accident to a man employed on the construction of the Regal Cinema. Mr. J. Chandler, Inspector of Factories, explained that a workman accidentally knocked down an electric lamp of the screw cap type suspended from a wall and he was found unconscious with the lamp clasped in his hand. The prosecution alleged failure to comply with the Factory and Workshop Act by Normanton, Ltd., Manchester. Two points arose: whether the premises were a "factory" within the meaning of the Act, and whether Messrs. Normanton were occupiers and the bench decided both points in the affirmative.

Mr. F. B. Turner, counsel for W. H. Smith and Co., electrical engineers, Manchester, against whom information was now laid by Normanton, Ltd., argued that Messrs. Normanton could shelve their liability only by complying with the section, which required that any other party alleged to be the actual offenders should be brought before the court. This had not been done. He submitted that the proceedings against Messrs. Smith should be dismissed. The Bench held that Messrs. Normanton had not complied with the section, and the case against Messrs. Smith could not be upheld. They imposed a fine of £5 with costs against Messrs. Normanton.

Crabtree Works Extension

A new works administration block is rapidly being completed at the Walsall factory of J. A. Crabtree & Co. The new extension will provide an increase of 25 per cent. in the factory space available for final assembly operations. The company has grown steadily since its inception, and the new administration block alone will be larger than the entire office accommodation in the original buildings erected in 1923.

Albanian Import Restrictions

A Ministerial Decision, dated August 19th, 1937, brings into effect the provisions of a Decree Law of April 25th, 1936, approving regulations for the control of foreign trade, and also confines the unrestricted importation of certain classes of goods to countries which have a " normal balance of commercial exchange " with Albania. According to the *Board of Trade Journal*, the importation of such goods from all other countries, including the United Kingdom, is subject to import licences. Applications for licences must be made by importers to the Ministry of National Economy through Chambers of Commerce in Albania. Amongst the goods requiring import licences are the following: Dynamos, accumulators, transformers and their metal parts, and electric motors; electricity meters; machines and apparatus for wireless telegraphy and telephony and lightning conductors; electric lamps and projectors and their accessories and batteries for electric hand lamps.

A Plastics Luncheon

The British Plastics Federation, Ltd., is holding a business luncheon at the Midland Hotel, Manchester, on October 7th when the principal speaker will be Mr. H. V. Potter, chairman of the Federation. Tickets (6s. 6d. each) can be obtained from the secretary, Mr. G. F. Beach, 1-3, St. Paul's Churchyard, E.C.4.

The Torbay Carnival

The Paignton Electric Light and Power Co., Ltd., took a prominent part in the Torbay Hospital Carnival which was recently held at Paignton. The company was responsible for the scenic and lighting effects at the Paignton floodlighted pageant, which was a feature of Carnival Week, the General Electric Co., Ltd., co-operating by lending the necessary lighting fittings. The main lighting was by banks of projectors mounted on top of the grandstand, supplemented by spot-lights and other local lighting. Pleasing effects were obtained by introducing colour on the brilliant costumes worn by the players. A feature of the carnival procession was the decorated trade vehicle class, in which event the British Thomson-Houston Co., Ltd., co-operated by sending its

The B.T.H. tableau in the recent Torbay hospital carnival held at Paignton

"Beauty Enriched by Light" display, this being awarded second prize in the open trade class. An advertising campaign was featured in the carnival programme, using the E.D.A.-E.L.M.A. slogan, "Better Light—Better Sight."

Street Lighting at Folkestone

The illustration on page 342 of our last issue showing the floodlighted Congregational Church at Folkestone also illustrates a section of the Dover Road end of Tontine Street, where there are three Ediswan "Stepney" lanterns erected at a height of 25 ft. and spaced at 110 ft., each lantern housing a 400-W "Escura" mercury-discharge lamp.

The Engineering and Lighting Equipment Co., Ltd., was responsible for part of the sodium lighting installation in Shorncliffe Road, illustrated on page 333 of our last issue.

Works Visit

A party of electrical contractors recently visited the works of Belling & Co., Ltd., Enfield, and on the same day toured the works of M. K. Electric, Ltd. The party was organised by the Hallamshire Electric Co., Ltd., and Electrical Components, Ltd., of Sheffield. Our picture shows the group at Bellings works.

Sheffield electrical contractors at the works of Belling & Co.

Australian Electrical News

Our Australian correspondent says that a wide discrepancy between tender prices for lamps manufactured in Britain and in Australia has caused keen discussion in Sydney. Tenderers for lamps for street lighting (Australian made) all put in the same price, £2,848, while one tenderer for lamps (British made) quoted £2,351. This means that after allowing the preference stipulated in the Local Government Act for Australian manufactures, the tender for British (Ensign) lamps was £261 less than the comparable Australian tender. The general manager of the Electric Light Corporation reported that the Australian made lamps were guaranteed for an average life of 1,350 burning hours, and the British lamps for 1,000 burning hours; and he recommended that two-thirds Australian-made lamps and one-third British-made should be purchased, but this recommendation met with some opposition, and the whole question is to be examined by the County Council.

Goulburn is now to link up with the Burrinjuck and Port Kembla grid, the Council having at length decided to accept the offer of the Minister for Works and Local Government (Mr. Spooner) of £16,500 for its generating plant. A sum of £7,000 is to be spent by the Cooma (N.S.W.) Council on the conversion of the town's d.c. supply to a.c.

The N.S.W. Minister for Works and Local Government (Mr. Spooner) recently announced that the new specifications respecting certain electrical appliances (previously referred to in these columns) will shortly be considered by the Electricity Advisory Committee and the Government, and, if accepted, will be immediately proclaimed. It has been recommended, however, that in order to allow manufacturers to adjust their methods to the new standards, six months' grace should be given before the proclamation takes effect.

Mr. D. C. Nixey, a London business man, has arrived in Sydney with the intention of founding a small factory for the production of certain components necessary to the Australian electrical industry.

Lantern Slides

Wild-Barfield Electric Furnaces, Ltd., have revised their lantern lecture completely, with the addition of details of new types of furnaces and the inclusion of many new slides depicting recent furnace installations. With the slides are provided details of the furnaces illustrated, thus forming the basis of a lecture which should prove of interest to societies, technical schools, &c. Several sets of slides have been made, and these and the lecture are lent free of charge and can be dispatched a few days in advance of the lecture date to enable the paper to be prepared.

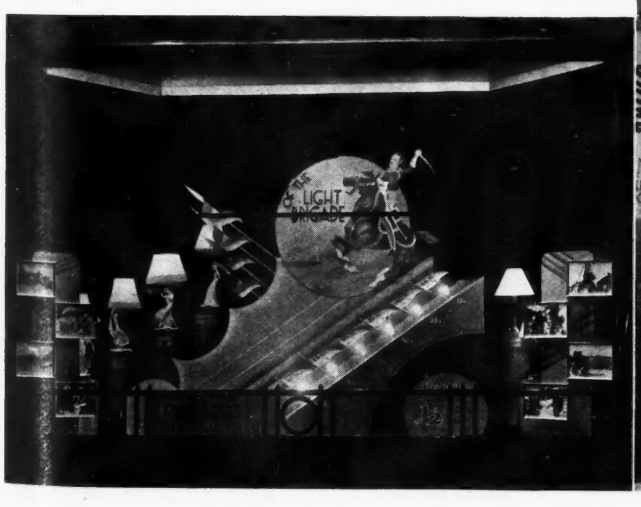
British Overseas Electrical Trade

Last month electrical equipment exported from this country attained the value of £1,400,638, an increase of £298,375, as compared with August, 1936, which contained an equivalent number of working days. Imports increased by £71,253 to £432,535.

Trade Announcements

Mr. E. Wilson, electrical goods dealer, Winsover Road, Spalding, Lincs, has acquired the business of the late Mr. W. H.

The general release of the film "The Charge of the Light Brigade" gives electricity showroom managers an excellent opportunity to arrange window displays which are both seasonal and topical. This week the County of London Electric Supply Co., Ltd., has prepared the attractive window below at its Streatham High Road premises to coincide with the presentation of the film at the local Astoria Cinema, the proprietors of which have reciprocated by accommodating the display shown on the right in the vestibule of their theatre *[Elec. Rev. photos.*



Stanger, Spalding, and is now carrying on business at 20, New Road, Spalding.

L. Barr & Co., electrical engineers and contractors, have opened new premises at 8, High Street, Clacton-on-Sea, Essex.

Mr. L. Vandervelde has removed to Ibex House, Minories, E.C.3.

J. F. Appelbe & Co. have closed their works at Salthouse Lane, and their only address now is Gt. Union Street, Liverpool.

Lighting in a Laundry

Reliable lighting is essential in a laundry for all finishing processes, and especially for examination of finished work. It also reduces the risk of scorching in hand ironing, and enables defects in articles received for laundering to be easily observed on reception. Good lighting is particularly necessary where coloured goods are being handled, for blemishes and slight defects are not always so clearly visible as where white articles are concerned. In the calendering room at the Reading and Caversham Laundry 150-W "Osram" lamps have been installed in "R.L.M." dispersive reflectors yielding an illumination on the working plane of from 8 to 10 ft.-candles. In the ironing department, shown in the accompanying illustration, similarly rated lamps are installed in "Glassteel" diffuser fittings to provide an average lighting intensity of 8ft.-candles. The finished work examining department is lighted by 300-W "Osram" lamps housed in similar fittings, and provides a lighting intnesity of 16 ft.-candles of colour-corrected light. Apart from the high and even illumination provided on the working plane in these departments adequate general illumination prevails. The lighting scheme was designed by the Illuminating Engineering Department of the General Electric Co., Ltd., and installed by B. French & Co.

The ironing department at the Reading and Caversham Laundry lighted by "Osram" lamps in "Glassteel" diffuser fittings

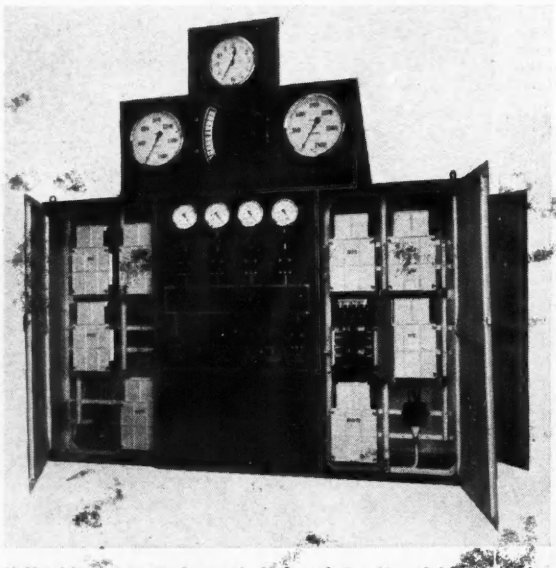
Craftsmanship and Draughtsmanship

The Physical Society announces that the ninth annual craftsmanship and draughtsmanship competition will be held as usual in conjunction with its annual exhibition of scientific instruments and apparatus in January next. Competitors must be in the regular employ of a firm or institution which will be exhibiting or has exhibited at least once during the previous three years, and which has been invited by the organising committee to enter its employés for the competition.

Steam Control at Norwich

A control cubicle designed by Hopkinsons, Ltd., for the Norwich Corporation Electricity Department houses the contactors and switchgear for the electrically controlled valves on the steam receiver. The fittings for the cubicle, including the contactors, switchgear and instruments, are of the firm's own manufacture, as are also the electrically controlled valves. The front panel carries a diagram, outlined in stainless steel strip, of the receiver and its connecting pipes, with the controls arranged in the pipe diagram to represent the valves which they control.

The cubicle contains also a comprehensive system of fuses and terminals which safeguard all the gear. The equipment on the front panel includes steam-pressure gauges, feed-water pressure gauges, and a steam critical pressure gauge. The outside of the cubicle is finished in crystalline black, with chromium-plated beading.



A Hopkinson control panel designed for Norwich Electricity Department

E.D.A. Activities

The British Electrical Development Association is again producing two calendars for 1938. One consists of four sheets each featuring a film star and containing a calendar for three months, the other has monthly sheets each illustrating photographically some outstanding sporting event of the year. Space is provided for overprinting the distributor's name and address. Two window displays have been prepared for linking up with the "Better Light—Better Sight" campaign. One is suitable for large showroom windows and the other is a smaller display unit. Two new double-crown posters are now available. E.D.A.1401 has a colourful design of the popular type of boiler-griller and E.D.A.1399 is a cooker poster. In connection with the "Better Light—Better Sight" campaign the Association has organised a children's competition. This consists of a number of drawings of rooms, together with a selection of lighting fittings. The children have to cut out the fittings they consider best for each type of room and paste them on the drawings, after which the pictures must be coloured either with paints or crayons.

Prices of Materials

Henry Gardner & Co., Ltd., report, September 15th: Copper bars (best selected), sheet and rod, £93, £2 increase. English pig lead, £23 5s., 10s. decrease. Spelter, £22, 18s. 9d. decrease. English block tin, £264 5s., £3 10s. increase.

Frederick Smith & Co. report, September 15th: Electrolytic copper bars, £63, £4 10s. decrease. Ditto, ditto, wire rods, £68, £4 10s. decrease. Ditto, ditto, h.c. wire $\frac{1}{16}$d., $\frac{1}{4}$d. decrease. Silicium bronze wire, 10$\frac{3}{4}$d., $\frac{1}{4}$d. decrease.

Edward Till & Co. report, September 15th: India rubber, Para fine, 9$\frac{1}{2}$d., $\frac{1}{4}$d. increase.

New Catalogues and Lists

Switchgear & Cowans, Ltd., Elsinore Road, Old Trafford, Manchester, 16.—Details of mining type pedestal switchgear employing internal earthing (leaflet 3-7).

C.A.V.-Bosch, Ltd., Acton, W.3.—A catalogue of compensated voltage control dynamos.

Lancashire, Dynamo & Crypto, Ltd., Trafford Park, Manchester.

National Clock Mfg. Co., Ltd., 19, St. Bride Street, London, E.C.4.—An illustrated catalogue of electric clocks.

Tricity Cookers, Ltd., 125, Strand, London, W.C.2.—A leaflet dealing with heavy-duty cookers.

English Electric Co., Ltd., Stafford.—Leaflets describing fractional h.p. motors for a.c. systems and certified flameproof motors and slip-ring gear.

Siemens Electric Lamps & Supplies, Ltd., 38/39, Upper Thames Street, London, E.C.4.—New season's catalogues of electrical appliances and lamps.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A catalogue (p. 43) of wiring systems.

R. F. Winder, Ltd., Belgrave Electrical Works, Leeds.—A register of new and secondhand electrical material.

Ellison Insulations, Ltd., Perry Bar, Birmingham, 20.—A booklet giving information as to the physical properties of "Tufnol" and the sizes in which it can be obtained.

Greenwood & Batley, Ltd., Albion Works, Leeds.—A brochure illustrating "Greenbat" trucks and tractors.

Hotpoint Electric Appliance Co., Ltd., 24, Newman Street, London, W.1.—A leaflet describing a new quiet ventilating fan.

National Lighting Co., Ltd., 19, St. Bride Street, London, E.C.4.—A catalogue of electric lighting fittings and floor and table standards.

Bankruptcy Proceedings

H. W. Fletcher, 233, Normanton Road, Derby, wireless dealer.—The first meeting of creditors was held on September 9th at the Official Receiver's office, 22, Regent Street, Park Row, Nottingham. Debtor, who had ranking liabilities of £345 and a similar deficiency, attributed his present position to lack of capital, trade depression, losses incurred on resale of wireless sets repossessed under hire-purchase agreement under which he became responsible for outstanding balances, and heavy overhead expenses. The matter was left with the Official Receiver.

V. F. Smith (R.W. Products), 12, High Street, Old Woking, manufacturer of radio aerials.—At the first meeting of creditors held recently at 29, Russell Square, London, W.C.1, the case being a summary one was left with the Official Receiver as trustee. Debtor, who had liabilities of £337 and assets of £288, attributed her present position to a slump in the radio trade during the summer months and to her consequent inability to liquidate her assets to meet the claims of creditors.

H. T. Cable (Light House), radio and electrical engineer, 171, Fog Lane, Didsbury, Manchester.—Receiving order made September 6th on debtor's own petition.

H. E. Carr, electric lamp distributor, 24, Glenthorn Road, Newcastle-on-Tyne.—Receiving order made September 8th on a creditor's petition.

L. C. Rowse, radio and electrical engineer, 60, Lower Market Street, Penryn, Cornwall.—Receiving order made September 7th on debtor's own petition.

H. Yewdall, electrician, 573, Meanwood Road, Leeds.—First meeting September 20th at 24, Bond Street, Leeds. Public examination October 5th at the County Court House, Leeds.

C. E. Grainger (Grainger & Co.), wireless engineer, 38, Market Street, Ashby-de-la-Zouch.—Supplemental dividend of 1¾d. in the £, payable September 17th at 22, Regent Street, Park Row, Nottingham.

J. O. Storey (J. Storey & Son), electrical engineer and wireless dealer, 227, Stockport Road, Ashton-under-Lyne.—Last day for receiving proofs for dividend September 22nd. Trustee, Mr. P. M. Milward, Byrom Street, Manchester, 3, Official Receiver.

C. J. C. Etchells, electrical and radio dealer, 8, Jedburgh Street, Middlesbrough.—Receiving order made September 2nd on debtor's own petition. First meeting September 21st at 80, High Street, Stockton-on-Tees. Public examination October 8th at the Court House, Middlebrough.

F. L. Wainwright, wireless dealer, 42, South Street, Yeovil.—Last day for receiving proofs for dividend September 24th. Trustee, Mr. A. L. Medcalf, 87, High Street, Portsmouth.

Company Liquidations

H. A. Stonham & Co., Ltd., electrical and radio dealers, 13, Mount Ephraim, Tunbridge Wells.—The report of the Official Receiver upon the compulsory liquidation of this company shows total liabilities of £6,081, of which £4,740 is expected to rank against net assets of £610, after deducting £1,269 for payment of the preferential and debenture claims, issued capital £1,200, and a total deficiency of £5,330. The company was formed in March, 1925, to take over as a going concern the business of a radio and electrical engineer carried on by H. A. Stonham at the above address and to carry on the business of electricians, electrical, radio, mechanical and general engineers. The purchase consideration was £1,000 in cash. In December, 1928, a branch was opened at Mayfield, Sussex, but that was closed at the end of 1935, when another branch was opened at 85, High Street, Tonbridge. The company's operations were successful until 1932, but losses were incurred for the years ended March 31st, 1933, 1935 and 1936. Early in 1937 execution was levied at the company's premises and on February 26th Mr. Stonham as debenture holder appointed Mr. H. W. T. Sinden, Tunbridge Wells, as receiver on his behalf. The receiver has carried on the businesses and it is understood that he has now sold the Tunbridge Wells business for £350 and the Tonbridge business for £600. The failure of the company is attributed to lack of capital during the last year of the company's existence and to other causes. Mr. Percy Wickenden, C.A., Tunbridge Wells, has been appointed liquidator, with a committee of inspection.

Stanedge Radio, Ltd.—Winding up voluntarily. Liquidator, Mr. G. L. Lawrence, 44, Belsize Square, Hampstead, N.W.3.

Dissolution of Partnership

Arthur F. Peacock, wireless dealers, 15, Bank Street, Teignmouth, Devon.—Messrs. A. F. Peacock and J. H. Spencer have dissolved partnership. Mr. Peacock will attend to debts and carry on the business.

Fire Factory Extensions

BY making a 20,000-sq. ft. extension to their Lancelot Road works, Wembley, Bratt Colbran, Ltd., have added about 40 per cent. to the actual factory space available, the total floor area now being in the neighbourhood of 70,000 sq. ft.

[*Elec. Rev.* photos.

The extended and rearranged factory of Bratt Colbran, Ltd., at Wembley. Above: One of the metal-working shops, with a store of "Evenheat" convector cases on the left. Right: A corner of the electric welding section

The company is well known for its manufacture of all types of fires—coal, gas and electric—but it is particularly to meet the recent rapid growth in the demand for electric models that the extensions have become necessary.

The utilisation of the new section as stockrooms for raw materials and finished products and as a packing and despatch department will free a large part of the old building for manufacturing processes and will provide all sections of the electrical department with the much-needed accommodation required for expansion. There will be room, too, for the establishment of an experimental laboratory, and additional ground at the rear can be brought into service for any future extensions that may become necessary.

The metal casting work is undertaken at the company's foundry at Belper, but apart from this and the making of small components such as the element formers the whole of the manufacturing processes are carried out under the same roof. An idea of the extent of the work is gained from the fact that no fewer than fourteen electric spot welders are in constant use. In addition to the metal-work, all the wood, marble, tile, &c., work for the surrounds—a speciality of the company—is done on the premises, as well as the making of special tools.

The fact that at one time a very large proportion of the company's orders was for special apparatus is reflected in the methods now employed in making standard equipment. In spite of the large number of stock lines now handled, there is no mass production, and it is the boast of the company that practically every one of its employés could, if necessary, carry out the whole process of manufacturing a fire from start to finish.

Besides the apparatus for which the company is perhaps best known, namely, inset and portable fires, a big demand has recently developed for a new range of convector heaters brought out a few months ago under the trade name of "Evenheat."

Electricity Supply

Lighting, Domestic, Power

Austria.—EXEMPTION OF POWER PLANTS FROM TAX.—For a period of from ten to twenty years after starting production hydro-electric power plants which provide 5,000 h.p. or more for at least six months each year are to be exempt from the corporation tax. The minimum capacity may apply to the combined production of several neighbouring plants of one company if they operate in accordance with a joint programme. Relief from the corporation tax applies only to plants whose construction is commenced between January 1st, 1932, and December 31st, 1946. Construction materials, machines and equipment must be of Austrian origin if the required quality is obtainable and the price is not considerably higher. After the third production year at least 55 per cent. of the output must be delivered to outside consumers. Smaller hydro-electric power plants may enjoy the same benefits if they deliver power to consumers in a territory in which electrical energy cannot be furnished by large power plants or can be furnished only on an uneconomical basis. The abolition of the corporation tax also applies under certain conditions to steam-operated plants of 1,500 h.p. and upwards if consuming low-grade domestic lignite or of 1,000 h.p. and upwards if consuming domestic coal waste.

Bideford.—LOWER CHARGES.—The Bideford and District Electric Supply Co., Ltd., has reduced to 1½d. per kWh, less 10 per cent., the charge for all electricity used for domestic purposes under the standard two-part tariff by consumers who cook by electricity and to 1½d. per kWh in other cases and for shop and business lighting. The revision takes effect from the date of the quarterly meter reading at the end of this month.

Blackpool.—EXTENSIVE ILLUMINATIONS.—The annual illuminations begin to-morrow (Saturday) and continue until October 25th. The number of lamps used is 300,000, the cost of apparatus and fittings £80,000 and the length of wiring 60 miles. There are 700 floodlight projectors, 51 lighted pylons, 25 miles of strip lighting, 25 searchlights, 184 illuminated canopies and 42 illuminated shelters. The largest tableau is 450 ft. long and weighs 11 tons. It depicts Guy Fawkes sitting on a bonfire surrounded by laughing children and is made in sixteen sections. Over 1,500 special trains are being run to Blackpool from all parts of the country.

Bolton.—SUB-STATION.—The Electricity Committee has acquired a site for a sub-station in Mayor Street Yard in connection with the supply in the Deane Road district.

Bradford.—SWITCH-HOUSES.—Sites have been selected by the Electricity Committee for the erection of two switch-houses in connection with the Valley Road power station.

LIGHTING.—Estimates prepared by the electrical engineer for lighting at the Horton Bank, Fairweather and Frizinghall Schools at a cost of £483 have been accepted by the Education Committee.

SUB-STATION.—The Electricity Committee is to provide a district sub-station in Saint Street, Great Horton. Cables are also to be laid, and the total cost is estimated at £29,418.

Bristol.—STREET LIGHTING.—After a trial period with four types of street lighting the Planning and Public Works Committee has decided to adopt colour-corrected mercury vapour lamps as the standard for main street lighting in the city.

IMPROVEMENTS AT THE DOCKS.—In order to meet the demands of the south-west side of the Avonmouth Dock the Docks Committee of the City Council reports that it is necessary to extend the high-voltage cables and switchgear to that side of the dock at a cost of £8,200 for equipment alone. It is also proposed to extend the high-voltage cables to sites on land north of the Royal Edward Dock and to provide sub-stations and switchgear to meet the demands of lessees who are building on land leased by the Docks Committee.

SUB-STATION.—The Electricity Committee has purchased land in Lambrook Road, Fishponds, for a sub-station.

POWER STATION EFFICIENCY.—In his report for the year ended March 31st last Mr. A. J. Newman, chief engineer and general manager of the Electricity Department, draws attention to a further slight improvement in the efficiency of the Portishead power station. Coal consumption per kWh generated amounted to 1.092 lb., against 1.10 lb. in the previous year.

PROGRESS.—Electricity sold to consumers during the year (240.5 million kWh) represented an increase of 36.8 million kWh, or 18 per cent., over 1935-36. In addition, the quantity exported to the C.E.B. (79.3 million kWh) was nearly double that of the previous year. Both industrial and domestic consumers contributed substantially to the expansion of sales in the Department's area of supply. With regard to the latter, the rate of development is indicated by the fact that at March 31st last there were 12,212 cookers and 14,529 water-heaters and wash-boilers connected, as compared with 3,565 and 1,150, respectively, at March 31st, 1934.

Burton-on-Trent.—RURAL SUPPLIES.—Sanction is being sought to provide a supply of electricity at Hoar Cross and Newchurch at an estimated cost of £4,000. The Electricity Committee is also to extend mains to supply Callingwood Hall.

Canada.—HYDRO-ELECTRIC STATIONS.—The West Kootenay Power Co. intends to proceed with a new hydro-electric project to develop about 100,000 h.p., learns *Reuter's Trade Service* from Ottawa. Most of the power will be used for the Kootenay company's extensive mining operations. This project will complete the company's development of Kootenay River power. Four other dams and power stations along the river already develop 220,000 h.p.

Cardiff.—ACQUISITION OF PENARTH UNDERTAKING.—According to the *Western Mail* it is understood that, subject to the settlement of a few technical details, the Cardiff City Council will pay the Penarth Electric Lighting Co. £92,000 for the purchase of its works and stock. The amount originally asked by the company was in the region of £127,000. About £8,000 profit has already been made on the undertaking this year while it has been in the hands of the Penarth Urban District Council for stocktaking purposes, the Council acting as go-between for the city. This £8,000 will, in due course, be handed over to the Cardiff Corporation. It is expected that Cardiff will complete the negotiations for taking over the concern before the end of the year.

Carlisle.—LOANS.—The Electricity Committee is seeking sanction to borrow £7,000 for transformers and sub-station equipment. Permission has been obtained to borrow £2,500 in connection with the supply of electricity to the holdings of the Land Settlement Association and £1,669 for providing a supply to Low Row and Beckstongate.

EXTENSIONS.—The Electricity Committee is to extend mains to the Grinsdale area at a cost of £486 and to Wetherel (£140).

Congleton.—REDUCED CHARGES.—After the September quarterly meter readings the following reductions in charges come into force: Domestic lighting, from 6d. to 5½d. per kWh for ordinary, prepayment and assisted-wiring scheme installations, and the multi-part tariff "unit" charge from ¾d. to ½d. All ordinary meter rents for meters used on domestic and business premises are to be 1s. per quarter.

Derby.—DEVELOPMENT.—During the past year the undertaking has continued its commercial development in a satisfactory manner, and the results indicate appreciation by the public of the attractive tariffs and other facilities offered, states Mr. F. Nicholls, borough electrical engineer, in his annual report. He adds that the advantages of electric cooking are making their appeal to a remarkable extent, no fewer than 4,363 cookers having been fixed during the year. The total number of cookers installed at March 31st was 12,267. Water heating continues to advance very satisfactorily, and the records show that 957 heaters were installed during the year, making the total number in commission 2,660. The immersion circulator, which is fitted into the existing bathroom tank, is an extremely convenient piece of apparatus, and there were 653 installed during the year. The wash boiler hiring scheme provides another example of the response to attractive facilities; 1,588 were installed on hire during the year, while 355 were sold. There were altogether 3,372 of these boilers in use at March 31st. The number of consumers increased during the year by 3,329, or 7.6 per cent., to 46,932. Under the assisted wiring scheme 853 consumers were added. Houses wired under this scheme number 12,998, and 495 installations have been paid for. There are approximately 54,258 premises in the area, and 87 per cent. have an electricity supply. Lighting, heating, cooking, power and traction apparatus connected to the system is equivalent to 194,851 kW, 45,884 kW having been added during the year, representing an increase of 31 per cent. The additional connections in kW were as follows:—Lighting, 2,797; power, 5,411; heating, 6,260; cooking, 21,316; water heating, 1,770; wash boilers, 6,102; and miscellaneous, 1,972. The maximum demand on the undertaking reached 27,200 kW, compared with 25,500 kW during the previous year, and the load factor was 38.06 per cent., as against 34.97 per cent. in 1935-36. Energy sold increased by 17 per cent. to 78.3 million kWh, the combined domestic and commercial tariffs yielding an expansion of 8.8 million kWh, or 46 per cent.

PUBLIC LIGHTING.—The expansion of public lighting by electricity has been greatly accelerated by the decision to place the borough street lighting entirely in the hands of the Electricity Committee as from the commencement of the past financial year, and it is anticipated that the whole of the public lighting will have been converted to electrical operation before 1938. A considerable length of route is now lighted by means of mercury and sodium electric-discharge lamps.

Dewsbury.—NEW CABLE.—In connection with the provision of a supply to the Dewsbury Moor housing estate a new cable is to be laid at a cost of £2,300.

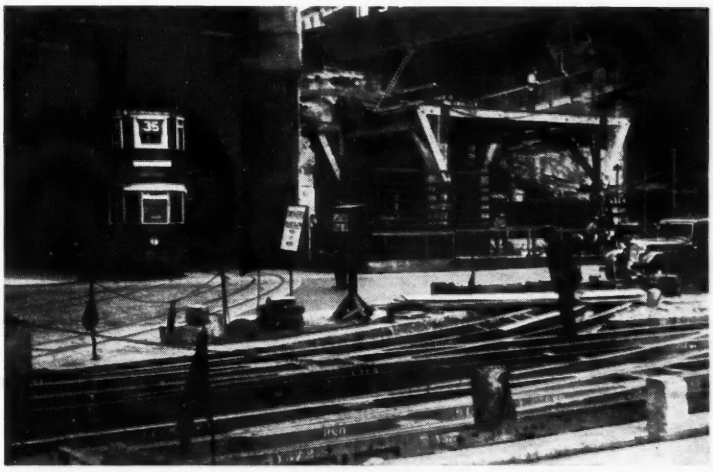
Guildford.—GENERAL ADOPTION OF "ALL-IN" RATE.—Attention is drawn by the borough electrical engineer (Mr. W. E. Affleck) in his annual report to the fact that sales under the "all-in" rate, apart from supplies to factories and for street lighting, amount to nearly three times those under the flat rates. An analysis of sales is as follows: "All-in" rate, 14,031,341 kWh (+5,350,399 kWh); lighting flat rate, 2,128,877 kWh (−67,145 kWh); heating flat rate, 2,657,856 kWh (−615,901 kWh); power and bulk supply, 6,188,520 kWh (+606,727 kWh); and public lighting, 535,017 kWh (+19,138 kWh). The total increase of more than 5¼ million kWh is by far the largest in any one year. The undertaking's load factor improved from 34.3 to 37.6 per cent.

Hazel Grove and Bramhall.—DOMESTIC DEVELOPMENT.—In the absence of practically any potential industrial load it must be realised that the future of the undertaking lies in the sphere of an increased domestic load, states Mr. A. D.

Pluck, engineer and manager of the Electricity Department, in his annual report. He adds that this field of activity contains great opportunities. As yet only the fringe of the market has been touched, and with concentrated sales propaganda he is convinced that the steady rate of progress of the undertaking will be maintained. Under the Department's schedule of charges, revised as from July 1st last, electricity is obtainable at ½d. per kWh under the domestic two-part tariff where an approved type of cooker or water heater is installed, or ¾d. otherwise, with a fixed charge of 20 per cent. up to £40 rateable value and 10 per cent. thereafter.

Hoylake.—CHURCH LIGHTING INSTALLATION.—A distinctive lighting installation has recently been carried out at the Hoylake Presbyterian Church to the plans of Mr. O. C. Waygood, M.I.E.E. Concealed lighting in the nave and transepts is contrived by a number of "Gecoray" floodlight reflectors equipped with pearl "Osram" lamps. The organ loft is floodlighted in flame colour. Over the pulpit is a specially designed metal shade which completely conceals the light source from the view of the congregation. With this on and the general lighting subdued a mellow and comfortable light is provided during the period of the sermon. To enable any deaf member of the congregation to follow the service by means of earphones G.E.C. sound equipment has been provided.

India.—HYDRO-ELECTRIC SCHEME IN SIND.—The Sind Public Works Department has now in hand a scheme for generating electricity at the Tando Mastikhan Fall on the Rohri Canal.



The track alterations nearing completion at the Embankment entrance to the Kingsway tramway subway in connection with the rebuilding of Waterloo Bridge

[Elec. Rev. photo

The project is estimated to cost one million rupees and will enable energy to be supplied to Sukkur, Rohri and neighbouring towns, and to a cement factory to be erected at Sukkur.

PROGRESS OF THE MALAKAND SCHEME.—Work on the Malakand hydro-electric power project started in 1934, and it is now expected that it may be possible to put the first stage of the scheme in operation by the end of this year. The cost of the undertaking has been estimated at Rs.6,500,000. It is designed to provide electrical energy in the Peshawar Valley and to be capable of extension to cater for the Kohat and Hazara districts. The power station, which will rely on the Swat River, will be situated near the Malakand Pass on the heights to the north of the Peshawar Valley.

MYSORE.—The Government of Mysore has recently sanctioned a scheme for the electrification of Davangere and Harihar at an estimated cost of Rs.879,000. Davangere is an important cotton centre and is the third largest city in Mysore State.

Irish Free State.—LIGHTING IMPROVEMENTS.—The Dun Laoghaire Council has decided to enter into a ten-year contract with the Electricity Supply Board which, briefly, provides for the erection, lighting, and maintenance of sixty-three 500-W lamps, 612 300-W lamps, and 1,363 200-W lamps. When the system is in full operation the annual cost will be £8,314, which compares with £5,800 at present expended on this service.

LIGHTHOUSE INSTALLATION.—The existing 340,000 candle-power incandescent gas light at the Tuskar Rock lighthouse will be superseded next year by an electric light of 1,250,000 candle-power. Buildings to house the dynamos have been completed. The lighthouse is also being equipped with radio direction-finding apparatus.

DUBLIN.—A £40,000 scheme for the provision of an improved lighting system in the central thoroughfares of Dublin, which has been the subject of discussions between the Corporation and the Electricity Supply Board for some years, has now been decided upon. An agreement has been entered into between these two bodies for the execution of the scheme, which will probably be spread over three years. The entire arc-lighting system now in use in the principal streets will be abolished and replaced by a system of high-wattage incandescent lamps. It is anticipated that the first section of the new scheme will be completed by the end of next March.

ELECTRICITY SUPERSEDES GAS.—It has been decided to light the central streets of Drogheda by electricity at a cost of £447. At present the lighting is by gas.

Leicester.—FLOODLIGHTING A SCHOOL PLAYGROUND.—The Elementary Schools Sub-Committee has approved a scheme for the floodlighting of the Taylor Street School playground during the winter months.

Lincolnshire.—TARIFF REDUCTIONS.—The Mid-Lincolnshire Electric Supply Co., Ltd., is reducing its flat rate tariff from 7d. to 6d. per kWh as from October 1st.

Llanfairfechan.—CHEAPER LIGHTING.—The lighting flat rate is to be reduced from 7d. to 6d. per kWh.

London.—DEPTFORD.—The London Electric Supply Corporation, Ltd., is to erect a sub-station in Frendsbury Road.

Meigle (Perthshire).—STREET LIGHTING.—A recent public meeting decided in favour of an electric street lighting scheme.

Settle (Yorks).—EXTENSIONS.—The Settle and District Electricity Co. has extended its mains at Longpreston, Bankwell Road and Stackhouse Lane, Giggleswick, at Austwick, and in Laundry Lane, Ingleton.

Sherston (Wilts).—ELECTRIC LIGHTING.—At a recent Parish Council meeting it was agreed that twenty-two lamps should be erected in the village according to a provisional agreement with the Wessex Electricity Co.

Stalybridge.—MAINS.—The Stalybridge, Hyde, Mossley and Dukinfield Transport and Electricity Board is to extend its low-voltage mains to Sidebottom Fold.

Stourport.—OVERHEAD LINES.—An application by the Shropshire, Worcestershire and Staffordshire Electric Power Co. for consent to the erection of overhead lines at Bird-in-Hand Lane and at Bigberry Lane, Wilden, has been approved by the Urban District Council.

Straits Settlements.—GEORGE TOWN.—Mr. T. Rogers, the municipal electrical engineer, reports that there was a further considerable reduction in power sales last year, due entirely to the rubber restriction. Increases in supplies for other purposes, however, resulted in the total sales improving from 11,557,304 to 11,577,838 kWh. The total number of consumers rose from 12,072 to 12,612, and connections increased from 12,208 to 12,411 kW.

Swansea.—SUB-STATIONS.—The Electricity Committee has acquired a site for a sub-station in Clifton Row.

Wakefield.—EXTENSION OF AREA.—Included in a Parliamentary Bill proposed by the Electricity Committee are provisions whereby there shall be added to the supply area of the Corporation those portions of the Stanley urban district which were added to the city by the Doncaster, Rotherham and Wakefield Extension Order, 1936.

West Ham.—NOTABLE PROGRESS.—Salient points in the 1936-37 report of Mr. J. W. J. Townley, engineer and manager of the Electricity Department, are that sales increased by 9 per cent. to 143.3 million kWh; domestic supplies increased by 3.5 million kWh (21 per cent.); nearly 2,500 kW of new industrial load was connected; 3,327 new consumers were connected, making the total in the area 52,338 (8,000 ten years ago); £47,728 was expended on apparatus for hire during the year; 2,225 cookers were installed, bringing the total at March 31st to 10,590; and a new scheme introduced last year resulted in the installation of 1,851 water heaters, bringing the total to 2,044.

Traction

Bradford.—TROLLEY-BUSES.—In connection with the proposed conversion of the City to Tong section of the tramway system to trolley-bus operation a cable is to be laid by the Electricity Committee at a cost of £2,452.

Denmark.—COPENHAGEN SYSTEM.—Figures recently published show that the electric trains of the Copenhagen suburban system cover 950,000 train-miles and 180,000,000 ton-miles a year, the train-mile total being about 8 per cent. of the State Railways' total for all forms of traction. The stock consists of sixty-two motor coaches and a similar number of trailers.

France.—ELECTRIFICATION ABANDONED.—The French Eastern Railway has decided not to proceed with the proposed electrification of its secondary suburban line from the Place de la Bastille, in Paris, to Vincennes and Verneuil-L'Etang. The steam train service is to be withdrawn and an intensive service of motor buses substituted. A suggestion that the Paris "Metro" system might take over the operation of the line has not been accepted.

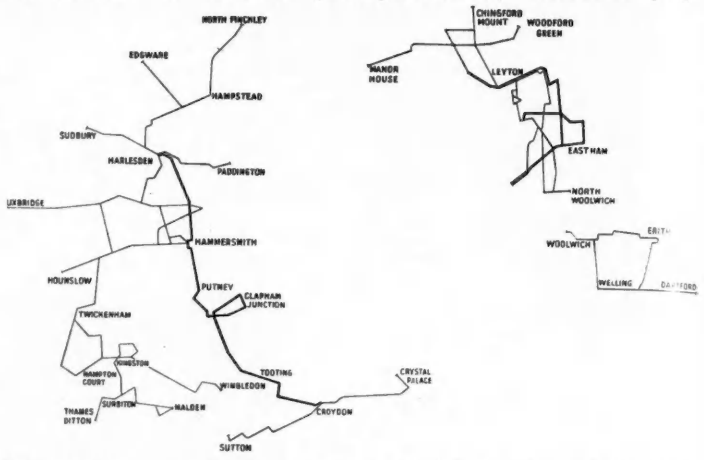
India.—ELECTRIC TRACTION SCHEMES.—The Great Indian Peninsula Railway has budgeted a sum of Rs.2.97 lakhs for the provision of remote control for the twelve manually controlled sub-stations on the electrified main line between

Kalyan, Igatpuri and Poona. The estimated yearly saving is 46,500 rupees. It is also proposed to purchase twenty-six electric motor coaches for operation round Bombay.

London.—RAIL WELDING.—Experiments having proved that the welding of rail joints results in a considerable reduction in noise, nineteen route-miles of track on the Northern Underground Railway are to be welded into 300-ft. lengths. Special scarped joints will be used between the long lengths of welded rails to effect a further improvement.

Newport (Mon).—TRAMWAY CEASES OPERATION.—The last tram journey on the Newport system was made on September 5th, since when buses have operated on all routes.

Sunderland.—TRANSPORT REPORT.—We have received from Mr. C. A. Hopkins, the general manager and engineer of the Tramways and Motors Department, his annual report for the year ended March 31st last. The number of passengers carried constitutes a record, those carried by trams having risen from 31.3 to 33.7 millions. The net balance was £39,620, as against £28,792 last year.



Map of London trolley-bus routes. The thick lines represent routes inaugurated last Sunday

NEW TRAM TRACK.—The Town Council has decided to double the tram track between the Royalty and Burn Park Road at a cost of £4,000.

South Africa.—GERMAN-BUILT LOCOMOTIVES.—The Siemens-Schuckertwerke and Henschel & Sohn A.G. have delivered to the South African Railways three 1,200-h.p. electric locomotives for freight service in Natal.

Communications

Great Britain.—BROADCAST PROGRAMME CHANGES.—To provide for an entertainment programme in addition to a separate Scottish schools programme it is necessary at certain times to use two exclusive wavelengths in Scotland, and for this reason the London and North National programme transmitters have to remain silent during the period of Scottish broadcasts to schools since the withdrawal from the Scottish National programme transmitter at Westerglen of the wavelength of 285.7 metres to allow for Wales and the West Country each to have a separate programme. For simplicity, it was decided to close down these transmitters on all weekdays until 5 p.m. rather than only on those days on which schools broadcasting takes place. Except in Scotland, therefore, since July 4th the National programme has been available on weekdays up to 5 p.m. from Droitwich only. It has been found that certain listeners are unable to receive Droitwich, some because they still possess receivers not fitted with a long waveband and others on account of electrical interference. It has accordingly been decided to adopt the alternative of closing the transmitters only on those days on which schools broadcasting takes place, as from Saturday, September 25th. From Monday, September 20th, the West of England Regional transmitter will be opened daily to transmit the National programmes before 5 p.m. when there are alternative programmes.

One of the first of ten A.E.C. trolley-buses to go into service at Cleethorpes

TELEPHONY IN THE SCOTTISH ISLES.—The island of Papa Stour was recently linked with Shetland by beam radio-telephone. The same system was adopted earlier this year for Foula, and all the more isolated islands in Shetland are now linked to the mainland of the group.

COMMUNICATION WITH FISHING FLEET.—A short-range radio-telephone service established on Monday enables people in any part of the United Kingdom to communicate with fishing vessels and other small craft equipped for radio-telephony off the east and west coasts. The service is operated through the Post Office coast radio stations Humber Radio, near Grimsby, and Seaforth Radio, near Liverpool. Its normal range at sea is about 100 miles from the coast stations, but this may often be exceeded under favourable conditions. The charge for a three-minute conversation to or from subscribers in any part of the United Kingdom is 7s., with 2s. 4d. for each additional minute. Those wishing to use the service should ask their exchange for "Humber Ships Telephone Service" or "Seaforth Ships Telephone Service," as the case may be.

India.—RADIO INTERFERENCE.—It is understood that legislation with regard to electrical interference with radio reception is contemplated.

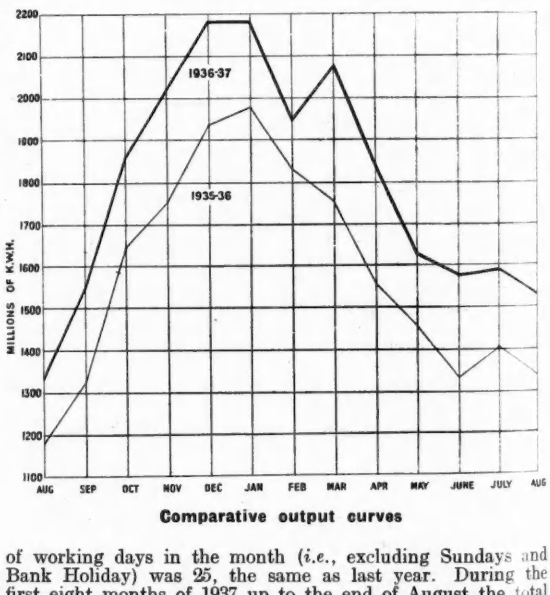
Morocco.—TELEPHONE PROGRESS.—The *Journal des Télécommunications* states that a good deal of attention is now being devoted to popularising the use of the telephone in Morocco. Lower tariffs have been introduced, with the result that 2,205 new subscribers were secured last year, whereas previously the number had been steadily declining. During 1936 a new 1,400-line telephone exchange was completed in Meknes. Plans are in hand for the establishment of an automatic telephone exchange in Oujda and the extension of those in Casablanca and Rabat.

New Zealand.—According to a *Reuter* message from Wellington it is estimated that 72 per cent. of the country's households are now equipped with radio receivers. On June 30th the number of licences isued had reached the record figure of 258,324.

Palestine.—TELEPHONY.—At the end of February last there were 13,034 telephone subscribers as compared with 10,381 at the close of 1935.

Generation of Electricity in August

THE official returns rendered to the Electricity Commissioners show that 1,529 million kWh of electricity was generated by authorised undertakings in Great Britain during August as compared with the revised figure of 1,332 million kWh in the corresponding month of 1936, representing an increase of 197 million kWh, or 14.8 per cent. The number of working days in the month (*i.e.*, excluding Sundays and Bank Holiday) was 25, the same as last year. During the first eight months of 1937 up to the end of August the total quantity of electricity generated by authorised undertakings was 14,339 million kWh, as compared with the revised figure of 12,627 million kWh for the corresponding period of 1936, representing an increase of 1,712 million kWh, or 13.6 per cent.



Comparative output curves

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aberdeen.—September 21st. County Council. Electrical work at thirty-four houses on the Waterton estate. Walker & Duncan, architects, 3, Golden Square.

Airdrie (LANARKSHIRE).—Town Council. Electrical wiring for various housing estates. Burgh surveyor.

Aldershot.—October 5th. Borough Council. Electrical installation at the Isolation Hospital, Cemetery Road. (See this issue.)

Australia.—MELBOURNE.—October 5th. Posts and Telegraphs, P.M.G. Department. Magneto and trembling bells and buzzers. (T. 19182/37.)* Generators and pole-changers. (T. 19183/37.)*
October 12th. Posts and Telegraphs Department. Switchboard cable. (T. 19443/37.)*

Bailey.—September 27th. Electricity Department. A.c. prepayment and ordinary house service type meters. (See this issue.)

Birkenhead.—September 24th. Mersey Railway Co. Metallic and carbon filament lamps and fittings and electrical sundries. J. Shaw, general manager and secretary, Central Station.

Brighton.—September 29th. Borough Council. Duplicate sets of air lift and high lift pumping plant, air compressors and electric motors, each capable of raising 1,500 gal. per hour, with auxiliary plant and other appurtenant works, in connection with the Colony for Mental Defectives, Laughton. Waterworks engineer, 12, Bond Street (deposit £2 2s.).

Calverley.—October 4th. Joint Hospital Board. Various works, including electrical, at the Woodhall Road Hospital, Thornbury. E. Bray, architect, Stanningley (deposit £1 1s.).

Cannock.—September 20th. U.D.C. Electrical wiring at the Littleworth senior boys' and girls' school. W. C. Speedy, clerk to the Council.

Chesterfield.—September 24th. R.D.C. Centrifugal pump, with electric motor and equipment, in connection with the Unstone sewerage and sewage disposal scheme. J. B. Wikeley, engineer to the Council, Public Assistance Offices (deposit £1 1s.).

Crayford (KENT).—September 27th. U.D.C. Two electrically driven sewage pumps, with motors, control panels, &c. F. A. N. Turner, engineer, Municipal Buildings (deposit £2 2s.).

Devon.—September 24th. Devon Mental Hospital Committee. Six months' supply of electric lamps, &c. C. Masters, Mental Hospital, Exminster.
September 22nd. Royal Devon and Exeter Hospital Committee. Twelve months' supply of electric lamps, &c. S. S. Cole, secretary and manager, The Hospital, Exeter.

Dunfermline.—September 28th. Town Council. Electric lighting at forty-two houses. Burgh engineer (deposit £1).

Durham.—September 24th. County Council. Education Committee. Electrical installation at the new Easington Colliery school. F. Willey, county architect, 34, Old Elvet.

Edinburgh,—September 27th. Electricity Department. Medium voltage switchgear for Portobello power station. (September 10th.)

Egypt.—MINIA.—October 5th. Municipal Council. Electric clocks. (T. 19412/37.)*

Fareham.—September 22nd. U.D.C. Three vertical-spindle, automatically controlled, centrifugal crude sewage pumps, and electric motors at the Peel Common pumping station, two sets at the Crofton Manor Farm station, and three ejectors with air compressors and motors at the Hill Head station. Lemon and Blizard, Lansdowne House, Castle Lane, Southampton (deposit £3 3s.).

Gloucester.—City Council. Electric meters and p.i. cables. (See this issue.)

Great Western Railway.—September 23rd. Telephones, telegraph instruments, &c., and electrical apparatus. (September 10th.)

India.—SIMLA.—October 2nd. Stores Department (Electrical Branch). A.c. and dc. house service meters. (T. 19308/37.)
October 7th. Converting plants. (T.Y. 19394/37.)*
NEW DELHI.—October 28th. Stores Department (Electrical Branch). Oil-engine driven generating sets and switchgear. (T. 19535/37.)

Irish Free State.—DUBLIN.—November 9th. Electricity Supply Board. Mechanical and electrical equipment for Poulaphouca Dam and Golden Falls Dam in connection with the hydro-electric development of the River Liffey at Poulaphouca, Co. Wicklow. Particulars from P. J. Dempsey, secretary, Electricity Supply Board. 60/62, Upper Mount Street (deposit £5 5s.), by September 24th.

London.—BATTERSEA.—September 20th. Electricity Department. Coal. (September 10th.)
EAST HAM.—October 11th. Borough Council. Electrical installation at a central clinic and public offices, Barking Road. (See this issue.)

Manchester.—September 30th. Town Hall Extension Special Committee. Display fittings for the Electricity Showrooms. F. E. Warbreck Howell, town clerk, Town Hall (deposit £1 1s.).

Middlesex.—September 30th. County Council. Bed and service lifts in the maternity block, Central Middlesex County Hospital, Willesden. (September 10th.)
September 27th. Automatic telephone cables at Shenley Hospital. (September 10th.)
October 4th. Bed lifts in blocks 11 and 12 at Chase Farm, Enfield. (September 10th.)

Midlothian and Peebles.—September 30th. District Asylum, Rosslynlee. One year's supply of electrical fittings. C. L. Addison-Smith, 19, Heriot Row, Edinburgh.

Newcastle-under-Lyme.—September 21st. Corporation. 172 high-power mercury vapour and/or gas-filled lamps, lanterns, fittings and columns erected complete. (See this issue.)

New Zealand.—WELLINGTON.—October 14th. Post and Telegraph Department. P.i. telephone cable. (T. 18926/37.)*
October 27th. Switchboard lamps. (T.Y. 19339/37.)*
October 26th. Public Works Department. 11,000-V p.i., l.c. circular conductors and outdoor type cable boxes. (T. 18932/37.)*
October 12th. Four sets of 110-kV outdoor disconnecting switches. (T. 19340/37.)*
November 16th. Lighting fittings, cable, cable boxes and switchgear. (T.Y. 19431/37.)*
December 7th. Public Works Supplies and Tenders Committee. Two exciters, 420-V switchgear and control board. (T. 18922/37.)* Switchgear and reactors. (T. 18920/37.)*
DUNEDIN.—October 20th. Corporation. Distribution transformers. (T.Y. 19430/37.)*

Oldham.—September 20th. Borough Council. Transformers. (September 10th.)

Salford.—September 29th. City Council. 6,600/400-V, three-phase power transformers and r.i. cables. (See this issue.)

South Africa.—CAPE TOWN.—October 20th. City Council. 4,000 metal-clad combined switch and fuse boards for use in connection with domestic supplies. (T.Y. 18941/37.)*
October 6th. Electricity Supply Commission. Distribution transformers. (T.Y. 19384/37.)*
DURBAN.—October 8th. Electrical Department. 6,600-V switchgear. (T. 19051/37.)*
October 22nd. Switchgear. (T. 19524/37.)*
OKAHANDJA.—October 30th. Municipal Electricity Undertaking. Power station and distribution network. (T. 19158/37.)*
PRETORIA.—October 7th. Public Works Department. Electric stoves, ranges, boiling tables, &c. (T. 15154/37.)*
JOHANNESBURG.—October 16th. City Council. Isolating links. (T.Y. 19491/37.)*

Staffordshire.—September 23rd. Potteries Water Board. Two vertical well pumps and one horizontal surface pump (2 million gal. per 24 hr. each), with electrical controls, cables, pipework and valves. P. Wilkinson, Staffordshire Potteries Water Board, Albion Street, Hanley, Stoke-on-Trent (deposit £5).

Straits Settlements.—SINGAPORE.—October 15th. Municipality. Pumps and electrical equipment for the sewage works. (T.Y. 19172/37.)*

Sutherland.—September 25th. County Council. Electric lighting at Helmsdale housing estate. E. W. Brannen, architect, Dornoch.

Swansea.—October 4th. Borough Council. Four l.v. substation feeder panels. (September 3rd.)

Uruguay.—MONTEVIDEO.—October 13th. State Electricity Supply and Telephones Administration. Three automatic voltage regulators for Diesel engine alternator-transformer sets. (T.Y. 18726/37.)*

Walsall.—October 12th. Electric Supply Committee. One three-phase testing equipment. (See this issue.)

Warrington.—October 4th. Electricity and Transport Committee. Cable, earthenware conduits and cable protector slabs and tiles. (See this issue.)

West Hartlepool.—September 24th. Electricity Department. H.v. testing equipment. (September 10th.)

West Riding.—September 27th. County Council. Electric lighting at the new Wombwell Technical Institute. Education officer, County Hall, Wakefield.

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberdeen.—Electricity Committee. Recommended. Storage tanks in connection with the extension of the boiler house at the electricity generating station (£6,315).—Hall, Russell & Co.

Bradford.—Electricity Committee. Accepted. Switchgear at Odsal, Four Lane Ends and Dudley Hill sub-stations.—Met.-Vick. Elecl. Co. Two sets of three-phase reactors for Four Lane Ends sub-station.—B.T.H.

Carlisle.—Electricity Committee. Accepted. Additional transformers (under existing contract).—Yorkshire Electric Transformer Co.
Housing Committee. Accepted. Wiring 148 houses on the Council estate (£735).—Hall & Stinson.

Douglas (I. o. M.).—Electricity Committee. Accepted. L.v. panel (£101).—New Switchgear Construction Co. Insulating oil filter (£135).—Metafiltration Co.

Dufftown (BANFFSHIRE).—District Council. Accepted. Electric street lighting at Craigellachie.—McKinnon (Elgin).

Hastings.—Electricity Committee. Accepted. Automatic fire protective installation at the Marine Court sub-station (£208).—Walter Kidde & Co.

London.—LEWISHAM.—Housing Committee. Accepted. Electrical installations in flats at Lee Terrace and Manor Park.—Payne Bros. Installations in flat at Burnt Ash Hill.—Unilectric, Ltd.

Manchester.—Electricity Committee. Accepted. Repairs to Nos.1 and 2 turbo-generator sets at the Barton power station.—Met.-Vick. Elecl. Co.

Sleaford.—Electricity Committee. Accepted. A.c. motors.—Higgs Motors, Ltd.

Perth.—Town Council. Accepted. Electrical installations at 130 houses.—A. Lindsay.

Surrey.—County Council. Accepted. Installation of armoured service cables, power and lighting, with main switchboard, subgear and internal lighting and power wiring at Warren Road Hospital, Guildford.—C. F. Williams, Farnham.

Swansea.—Education Committee. Accepted. Electrical installation at Gors school extension (£275).—Magneto Repair & Winding Co.

Electricity Committee. Accepted. "Bridge Megger" testing set.—Evershed & Vignoles. Oil testing set.—Met.-Vick. Elecl. Co.

Walsall.—Electricity Committee. Accepted. Electric ironing machine (£1,050).—Thorpe Medley & Co.

Forthcoming Events

Association of Mining Electrical Engineers (*South Wales Branch*).—Saturday, September 18th. 3 p.m. Visit to the pumping station of the Severn Tunnel at Sudbrook, near Portskewett.

Association of Supervising Electrical Engineers.—Saturday, September 18th. Visit to the Engineering and Marine Exhibition, Olympia.

Junior Institution of Engineers.—Saturday, September 18th. Visit to the Engineering and Marine Exhibition, Olympia. Wednesday, September 22nd. Visit to the new headquarters of the London Fire Brigade, Albert Embankment. Saturday, September 25th. Visit to the Mogden purification works, West Middlesex drainage, Isleworth.

Institution of Electrical Engineers.—Thursday, September 30th. Visit to the Engineering and Marine Exhibition, Olympia.

National Smoke Abatement Society.—Thursday, September 30th, to Saturday, October 2nd. Leeds. Annual conference.

Notes

Foundations for Motors

In "Modern Fixing Practice" (Rawlplug Co., Ltd., 3s. 6d.) a rule is given for determining the weight necessary for the concrete foundation of a portable belted motor. For single-leather belt drive multiply the width of the belt in inches by 720; then the total dead weight in lb. of motor and foundations must equal this number in order to avoid movement in a horizontal drive. If the drive is vertical, or partly so, a constant of 450 may be used instead. For heavier drives with a double-leather belt the above figures should be multiplied by 1.6. The amount of concrete required is obtained by deducting the weight of the motors and bedplate from the total.

Engineering Education

A "Student's Guide" published by the Regional Advisory Council for Technical Education contains five tables of particulars of the facilities offered by twenty-six colleges and technical schools for evening and day courses in electrical and mechanical engineering. Provision is made for trade courses, *e.g.*, installation work, telephony, radio, cable jointing and instrument making, as well as those leading to the acquiring of a national certificate, external London and other degrees. Further information is obtainable from the director of education, Deansgate, Manchester.

Engineering Degrees at Manchester

Conditions of entry for a degree course at the Municipal College of Technology, Manchester, after December 1st will differ from those now in force. Alterations to the ordinance relating to the Intermediate B.Sc. Tech. examinations have also been made to take effect for the 1938-39 session; these include the addition of physics as an examination subject and modifications in the number of subjects in which a candidate is required to pass. Particulars may be obtained from the secretary, Joint Matriculation Board, 315, Oxford Road, Manchester, 13.

A.S.E.E. (Manchester Branch)

On September 9th a party of members of the Manchester and District Branch of the Association of Supervising Electrical Engineers paid a visit to the Greenfield Paper Mill of Robert Fletcher & Son, Ltd.

Change of Address

The post office box number of the South African Institution of Engineers has been changed to 5907.

A Discerning Palate

The lady who had come in "to oblige" was cleaning the electric cooker when the housewife temporarily under the obligation entered the kitchen. "I don't hold with them," remarked the cleaner as she handled gingerly detached portions of the unplugged stove. "My sister has one, and I always tell her everything she cooks in it tastes of electricity.—*Manchester Guardian.*

Educational

The new term for day courses at Brighton Technical College begins on September 21st and for evening courses on September 20th. In the Engineering Department, of which Dr. E. Hughes is the head, full-time day tuition is given for the engineering degree of London University and the higher national diploma of the I.E.E. In addition, part-time day and evening classes are held in connection with the national certificates of the I.E.E., City and Guilds certificates for electricians and Post Office engineers, and for radio communication. The college possesses well-equipped laboratories, and practical instruction is given in such subjects as cable jointing and radio-service work.

Classes in electrical engineering commence on September 27th at various L.C.C. technical institutes.

Enrolment begins on September 20th in the Electrical Engineering Department at the Borough Polytechnic.

(See our classified advertisements.)

World Metal Production and Consumption

The customary statistics concerning the production and consumption of non-ferrous metals in recent years have been issued by the Metall Gesellschaft, of Frankfort-on-Main. The appended tables show the results, the most striking feature being the expansion in the consumption of aluminium.

CONSUMPTION IN THOUSANDS OF METRIC TONS.

	Aluminium.	Lead.	Copper.	Zinc.	Tin.
1929	276.0	1,702.7	1,760.9	1,440.3	193.9
1932	138.3	1,102.6	904.1	836.6	176.6
1935	306.6	1,453.7	1,527.6	1,374.5	161.4
1936	407.4	1,579.1	1,778.7	1,500.7	173.0

PRODUCTION IN THOUSANDS OF METRIC TONS.

	Aluminium.	Lead.	Copper.	Zinc.	Tin.
1929	282.1	1,739.5	1,894.8	1,457.4	195.1
1935	259.6	1,370.8	1,494.9	1,337.6	148.5
1936	366.5	1,467.4	1,698.4	1,472.2	187.0

Activity at Bristol

In the article bearing the above heading in our issue of September 3rd, we referred to the consumption of electricity at the cocoa and chocolate factory of J. S. Fry & Sons, Ltd., as being something like a million kWh per annum. This should read nine million kWh per annum.

Light Railway Transport League

The first meeting of members of the Light Railway Transport League was held in Cricklewood on Saturday, September 11th. The total attendance was very satisfactory. A cine programme was presented by Mr. Fowler, including interesting films of ex-M.E.T. tramcars in north-west London, as well as of the 4,000-mile interlinked Belgian vicinal tramway and light railway system.

The films were followed by the discussion of tramway topics and steam light railway matters. Mr. S. J. Patmore, A.M.I.E.E., is to read a paper at the next meeting.

Apppointments Vacant

Electrical engineer and manager (salary £950, rising to £1,250 per annum) for Beckenham Corporation.

Chief commercial assistant, assistant consumers' clerk and junior showroom assistant (female) for Hammersmith Electricity Department.

Junior sales engineer for Hull Electricity Department.

General clerk for Bridport Electricity Department.

Temporary mechanical and electrical engineering assistants in the drawing office of the Air Ministry and at R.A.F. aerodromes.

Telegraph inspector for the Government of Sierra Leone.

Junior assistant mains engineer for the Colne Valley Electricity Supply Co., Ltd.

Mechanical and electrical supervisors at R.A.F. stations.

Civilian wireless instructors for the Electrical and Wireless School, R.A.F., Cranwell.

Technical officer at the R.A.F. Establishment, South Farnborough.

Canvasser for the Brentford and Chiswick Electricity Department.

Service mechanic for Luton electricity showrooms.

(See our classified advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

CARROL cable clips.

DICAL adaptable fittings for showrooms.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

At a meeting of the Dover Corporation Electricity Committee on September 6th the town clerk referred to the question of additional remuneration to the electrical engineer and other officers which, by a minute dated June, 1933, had been left over until the completion of the change-over. The Committee agreed that **Mr. Harpur** should receive £275 and **Mr. Broad** £235.

Mr. E. H. W. Cooke, comptroller of Associated Electrical Industries, Ltd., has been elected a director of the Birmingham Small Arms Co. and has also been appointed managing director of the Daimler Co.

Mr. G. T. Joyce, former assistant manager of the Brighton Corporation electricity undertaking, who retired at the end of last year, was presented on September 13th with a framed address. The testimonial, handed to Mr. Joyce by the Mayor, records the thanks and appreciation of the County Borough, the Council and the Electricity Committee for Mr. Joyce's valued services over forty-five years.

Mr. J. E. Hart, Grad. I.E.E., assistant engineer in the wiring and installation department of the Islington Borough Council, has been appointed assistant installation and consumers' engineer in the Barking Corporation Electricity Department. Mr. Hart was previously with the Rugby Corporation, where he received his early training, and he went to Islington a year ago.

Mr. J. B. L. Manzano, who acted as installation engineer for the ventilation plant and equipment for the Norris Warming Co. at the Earls Court Exhibition (recently described in our pages), informs us that he has commenced business on his own account as heating and ventilation engineer at 4, Mansfield Avenue, West Green, Tottenham, N.15. Mr. Manzano joined the British Thomson-Houston Co., Ltd., in 1909, where he gained experience in the meter, controller and turbine shops. In 1913 he entered the Bedford Corporation Electricity Department, and in the following year enlisted in the Royal Engineers, serving throughout the War. From 1919 to 1927 he was engaged in general engineering work, after which he joined Matthew & Yates, Ltd. He was appointed clerk of the works for J. Gardner & Co., Ltd., and in the following year was engaged by the Norris Warming Co. for the Earls Court installation.

Mr. J. B. L. Manzano

The wedding recently took place at Quorn (Leics) Parish Church of **Miss Alma Schepens** and **Mr. I. B. Cooke,** of the Brush Electrical Engineering Co., Ltd., Loughborough. The bridegroom is a son of Mr. W. H. Cooke, a director of the company, and the bride was formerly a member of the office staff.

Miss Anna Holm, for many years chief demonstrator to the North-Eastern Electric Supply Co., Ltd., under Mr. W. F. T. Pinkney, M.I.E.E., has opened a tea and guest cottage called "Beam Ends" at Beeding, near Steyning, Sussex. The cottage has electric cooking, refrigeration and other modern amenities.

Mr. L. E. Le Vee and Mr. W. C. Pegley, co-managing directors of Vactric, Ltd., and Apex-Vactric, Ltd., who will address distributors, factors and dealers of the two companies at a sales campaign meeting to be held on Monday next

Obituary

Mr. R. Allen.—We record with very deep regret that Mr. Roland Allen, only son of the late Mr. Arthur H. Allen, technical editor and a director of the ELECTRICAL REVIEW for many years, died at Scarborough on Friday last at the early age of thirty-seven years. Mr. Allen succumbed to a complication of tonsilitis, pleurisy and pneumonia while on holiday. Seldom has father shown greater keenness regarding a son's scientific and general education, and felt more pride in his progress, than did our late colleague in relation to Roland Allen. A brilliant record at college was followed by the winning of a special scholarship to the City and Guilds, but his course of study was broken into by a period of service in the War. He was about to be sent to Russia with his regiment when the Central Technical College authorities secured his discharge so that he could resume his scholarship. He obtained a first class hons. B.Sc. (Eng.) London University degree, and after an apprenticeship at Woolwich Arsenal was in the service successively of the Prat Draught Co. in London and of the I.C.I. in the north-east district. Later he was assistant to Dr. Lessing in London, specialising in fuel economy and clean coal. In this connection he owned several patents, and for many years, down to the time of his death, he was on the staff of the Berrisford Engineering Co., Ltd., at Stoke. He contributed a number of papers to engineering societies, for which he received awards. Mr. Allen leaves a widow, with whom and with his mother, Mrs. A. H. Allen (114, East Dulwich Grove, S.E.22), there will be widespread sympathy. The funeral took place on Tuesday at Honor Oak Cemetery.

Monsieur H. Cahen.—The death has occurred, at the age of sixty-two, of Monsieur Henri Cahen, the president of the Union des Syndicats d'Electricité. During the war he was head of the power supply services of the French Ministry of Munitions.

Wills.—Mr. H. R. Savory, a former chairman of the City of Wellington Electric & Power Co., left £11,668 (net personalty £10,787).

Mr. G. F. Plutte, managing director of the Enfield Cable Works and late managing director of the Enfield Rolling Mills, left £168,974, with net personalty £143,658.

New Books

Measurement of Radiant Energy. Edited by W. E. FORSYTHE. Pp. 452; figs. 224. London: McGraw Hill Publishing Co., Ltd. Price 30s.

This handbook, edited by W. E. Forsythe and prepared under the combined direction of himself, A. C. Hardy and H. E. Ives for the National Research Council, deals with most aspects of radiation measurement. The twenty-one contributors are drawn from American commercial laboratories, universities and the Bureau of Standards, the result being that fundamental principles and details of application receive each their due weight. The fact that the viewpoint is somewhat different from that in this country (especially apparently with regard to interferometers, which are not considered) will make it no less valuable to readers more familiar with the practice in Great Britain.

Of the five main divisions of the subject—concepts and laws, sources, analysis, methods for measuring radiations and special problems—the first and last are the smallest and probably of least general interest. In the remainder there is a very large amount of practical information, presented in a way that makes it immediately useful in a laboratory or workshop, with an abundance of adequate diagrams and references to original literature.

Of particular interest is E. F. Barker's short account of instruments for infra-red spectro-radiometry, which has unique authority in coming from one of Randall's principal co-workers at the University of Michigan. One obtains from it an idea of the difficulty and fascination of work in the infra-red. It is mentioned, incidentally, that a reasonably good approach to a flat for a coarse grating can be obtained by cutting with a suitable steel tool a lead-tin alloy coated on a hard base. Another outstanding article is by Fassin, of the Bausch and

Lomb Optical Co., on spectro-meter and spectro-graph slits. As with some other articles, the technique described has probably application to other than purely optical instruments.

This work can be highly recommended. It certainly succeeds well in answering such questions as: What do the different radiation laws represent? Just what results do they give? How should radiant energy be specified? What sources should be used for different purposes? And what method of analysis should be used for a particular purpose?

Wireless Servicing Manual. By W. T. COCKING. Pp. 241; figs. 95. London: Iliffe & Sons, Ltd. Price 5s.

It is a tribute to the author of this book no less than an indication of rapidity of developments that a third edition should be called for within a few months of the publication of the second. Principles of testing receivers are explained in a thoroughly practical way so as to meet the needs of the amateur as well as of the professional. Testing apparatus is described in detail and testing methods discussed, but the major part of the contents deals with methods of locating and remedying faults. A new chapter on the aerial-earth system has been added and the appendices have been revised to include the latest reference material. In the latter are included base connections for valves, British and foreign, and colour codes for components.

Radio Servicing Simplified.—Pp. 150; figs. 16. London: The Automatic Coil Winder & Equipment Co., Ltd. Price 2s. 6d.

This is the sixth edition of a book intended primarily as a work of reference for dealers and service engineers, but containing enough elementary matter to enable it to be of assistance to amateurs. The new edition has been entirely rewritten to meet modern requirements and in the light of present-day standards of knowledge It covers the whole range of testing practice for modern receivers, with particular reference to the "Avo" series of electrical measuring instruments manufactured by its publishers. Other information likely to be of use to those interested in the working of radio is also presented in a clear and simple manner.

A.B.C. of Refrigeration. By T. MASON. Pp. 63; figs. 45. London: Batwin Electrical Appliances, Ltd. Price 2s. 6d.

This is a practical handbook intended primarily for men engaged in the repair and servicing of electric refrigerators. Starting with a simple (but not superficial) explanation of the principles involved, it goes on to describe briefly the various parts of the refrigeration system with the aid of clear diagrams and to discuss methods of installation. All the complaints likely to be met with are itemised in another chapter with the numerous possible causes in each case. The points to be observed in removing the component parts are dealt with in logical sequence and hints are given on setting up a repair shop with an account of the tools and equipment necessary. It is rightly emphasised that the hints given in this book, practical as they are, are supplementary only to experience. While the man who is content to work in a rule-of-thumb way will obtain useful information from this book, there is enough information of a more technical kind to enable him to become conversant with the theoretical ground on which his work is based. In the introduction to the book, which is of American origin, the author states that the refrigeration industry is swinging away from ammonia and carbon-dioxide machines and that this treatise is concerned mainly with those using sulphur dioxide, methyl chloride and freon with some reference to isobutane and ethyl chloride.

Wages and Labour Conditions in British Engineering. By M. L. YATES, M.Sc.Tech., M.A.(Com.). Pp. 172. London: Macdonald & Evans. Price 6s. net.

This exhaustive study of the labour side of the engineering industry analyses the industry into its main sections to show the course of employment since the war. A notable feature is the increase in the electrical and motor vehicle sections while general and marine engineering has fallen off. The various classes of engineering workers are then considered and the changes in training and necessary qualifications are brought out. Organisations of engineering employés and agreements as to wages and conditions are then dealt with, leading up to trade union policy, methods of payment and rates of earnings. A separate chapter is devoted to women workers and a useful bibliography is appended to the work.

Shorter Notices

"Physics for Students of Applied Science," by J. E. Shrader. Pp. 638; figs. 581. Price 24s. "Radio Engineering," by F. E. Termon (second edition). Pp. 813; figs. 474. Price 36s. "Theory of Alternating Current Machinery," by A. S. Langsdorf. Pp. 788; figs. Price 36s. London: McGraw Hill Publishing Co.

"Lectures on the Mathematical Theory of Electricity," by F. B. Pidduck. Pp. 110; figs. London: Oxford University Press. Price 7s. 6d.

"Stores Accounts and Stores Control," by J. H. Burton. Pp. 236. London: Sir Isaac Pitman & Sons. Price 10s. 6d.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

British La Bour Pump Co., Ltd.—Private company. Registered September 10th. Nominal capital, £10,000. Objects: To acquire the licence to use certain patents and manufacturing data and experience of H. E. La Bour, as used by La Bour Co., Inc. (a corporation existing under the laws of Indiana and having its principal place of business in Elkhart, Indiana, U.S.A.); and to carry on the business of mechanical, electrical and general engineers and contractors, iron and metal founders, toolmakers, manufacturers of and dealers in air compressors, air compression plant, pumps of all kinds, pneumatic drills and tools, &c. The directors are: H. E. La Bour, Elkhart, Indiana, U.S.A., J. A. Dienner, Evanston, Illinois, U.S.A., A. M. Ewing, address not stated, J. MacGregor, 30, Maresfield Gardens, Hampstead, N.W.3, and G. W. Riley, address not stated. Solicitors: Biddle, Thorne, Welsford & Gait, 22, Aldermanbury, E.C.2.

Lawson's (Bury St. Edmunds), Ltd.—Private company. Registered September 11th. Capital, £3,000. Objects: To carry on the business of designers, manufacturers, factors and repairers of and dealers in radio apparatus, radio service agents, &c. The subscribers are: C. S. Lawson, 67, Mill Road, Bury St. Edmunds, and two others. C. S. Lawson is permanent director and chairman. Solicitors: Woolnough, Gross, Son & Chamberlayne, 50, Abbeygate Street, Bury St. Edmunds.

Boro' New Electric Signs, Ltd.—Private company. Registered September 11th. Capital, £1,000. Objects: To carry on the business of gas, electrical and general engineers, makers of and dealers in signs of all kinds, &c. The subscribers are: C. H. Armitage, 25, Lyncroft Avenue, Pinner, Middlesex, and H. W. Tucker, 129, Benhill Road, S.E.5. Solicitors: Beardall, Fenton & Co., 10, George Street, W.1.

Melba Manufacturing Co., Ltd.—Private company. Registered September 11th. Capital, £1 000. Objects: To acquire the business of a radio and electrical engineer, carried on by J. W. Stead as The Melba Manufacturing Co. at 4, Devonshire Road, Forest Gate, S.E.23. The directors are: J. W. Stead, Boughton Mount Farm, Maidstone, and three others. Registered office: 213, Queens Road, Peckham, S.E.

William Scott & Co. (Glasgow), Ltd.—Private company. Registered in Edinburgh September 8th. Capital, £250. Objects: To carry on the business of electrical contractors and dealers in electrical accessories, &c. The directors are: A. Scott, 12, Salen Street, Glasgow, and H. L. Berkovitz, 49, Nithsdale Road, Glasgow. Registered office: 75, Jamaica Street, Glasgow.

Electro Magnetic Recording, Ltd.—Private company. Registered September 9th. Capital, £3,000. Objects: To carry on the business of manufacturers and sellers of recording machines of all kinds and particularly those employing steel wire or tape, &c. The directors are: G. G. Nuttall, Knighton, Rydal Drive, Hale Barns, and three others. Solicitors: Lancashire, Humphreys & Grundy, 2, John Dalton Street, Manchester, 2.

Returns of Electrical Companies

Walters & Company (Parkstone), Ltd.—Satisfaction on June 30th, 1937, of charge dated March 15th, 1937, and registered March 30th, 1937. According to the register of mortgages the only charge registered March 30th, 1937, was a mortgage which originally secured all moneys due to bank.

Express Refrigerating Co., Ltd.—Particulars filed of £10,000 debentures, authorised August 20th, 1937, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £4,000.

Franco British Electrical Co., Ltd.—Mortgage and charge on land at Hendon and the company's undertaking and other property, present and future, including uncalled capital, dated September 1st, 1937, to secure all moneys due or to become due from the company to the National Provincial Bank, Ltd., and ranking in priority as regards the land at Hendon to debenture issued to Branch Nominees, Ltd.

Bussey & Sabberton Bros., Ltd.—Debenture, charged on the company's undertaking and property, present and future, including uncalled capital, dated August 23rd, 1937, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

Steyning Electricity, Ltd.—The nominal capital has been increased by the addition of £20,000 in £1 unclassified shares beyond the registered capital of £150,000. At May 3rd, 1937, the Electric Supply Corporation, Ltd., held practically all the shares.

Central Sussex Electricity, Ltd.—The nominal capital has been increased by the addition of £30,000 in £1 unclassified shares beyond the registered capital of £230,000. At May 3rd, 1937, the Electric Supply Corporation, Ltd., held practically all the issued shares.

Para Electric Railways & Lighting Co., Ltd.—Capital, £780,000 in 390,000 preference and 390,000 ordinary shares of £1. Return dated June 28th, 1937. 325,000 preference and 390,000 ordinary shares taken up. £25,040 paid on 25,000 preference and 40 ordinary shares, £689,960 considered as paid on 300,000 preference and 389,960 ordinary shares. Mortgages and charges: £533,118.

Weston-super-Mare & District Electric Supply Co., Ltd.—Capital, £180,000 in 40,000 cumulative preference and 140,000 ordinary shares of £1. Return dated June 11th, 1937. All shares taken up. £100,000 paid on 40,000 preference and 60,000 ordinary shares, £80,000 considered as paid on 80,000 ordinary shares. Mortgages and charges nil.

Automatic Electrical Refrigerators, Ltd.—Capital, £5,000 in 4,985 preference shares of £1 and 300 founders' shares of 1s. Return dated July 28th, 1937. 3,700 preference and 300 founders' shares taken up. £3,715 paid. Mortgages and charges nil. A return of allotments made up to August 6th, 1937, shows a further 300 preference shares allotted for cash.

Sudan Light & Power Co., Ltd.—Capital, £500,000 in 406,000 ordinary and 94,000 preference shares of £1. Return dated July 8th, 1937. 406,000 ordinary and 52,000 preference shares taken up. £433,000 paid (£1 on 356,000 ordinary and 52,000 preference and 10s. on 50,000 ordinary). Mortgages and charges: £400,000.

Lamp Caps, Ltd.—Capital, £50,000 in £1 shares. Return dated August 3rd, 1937. All shares taken up. £50,000 paid. Mortgages and charges nil.

A. S. McHugh & Co., Ltd.—Mortgage dated November 2nd, 1931, charged on 46, Sandhill, Newcastle-on-Tyne, being property acquired by the company on August 12th, 1937. Amount owing £2,210 registered pursuant to Section 81 of the Companies Act, 1929. Mortgagees: Universal Permanent Building Society, Ltd., 39, Grey Street, Newcastle-upon-Tyne.

Southern Welding Co., Ltd.—Particulars filed of £300 debentures authorised August 26th, 1937, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £150.

Corlett Electrical Engineering Co. (1933), Ltd.—Capital, £1,500 in £1 shares. Return dated July 13th, 1937. 1,025 shares taken up. £525 paid, £500 considered as paid. Mortgages and charges: £125.

Oxford Electric Co., Ltd.—Capital, £350,000 in 150,000 6 per cent. cumulative preference and 200,000 ordinary shares of £1. Return dated April 20th, 1937. All shares taken up. £316,000 paid on 150,000 preference and 166,000 ordinary shares, £34,000 considered as paid on 34,000 ordinary shares. Mortgages and charges nil.

Seaford and Newhaven Electricity, Ltd.—Capital, £120,000 in £1 shares. Return dated May 3rd, 1937. 90,000 shares taken up. £90,000 paid. Mortgages and charges nil.

Austinlite, Ltd.—Capital, £6,000 in £1 shares. Return dated May 21st (filed June 17th), 1937. All shares taken up. £6,000 paid. Mortgages and charges nil.

A. S. Howarth, Ltd.—Capital, £2,000 in £1 shares. Return dated June 15th, 1937. 250 shares taken up. £250 paid. Mortgages and charges nil.

Vacuums, Ltd.—Satisfaction to the extent of £6,320 on June 16th, 1936, of debentures authorised June 19th, 1934, and registered July 31st, 1934. According to the register of mortgages, the debentures registered July 31st, 1934, originally secured £15,000. (Notice filed September 3rd, 1937.)

City Notes

J. & F. Stone Lighting & Radio, Ltd. held its annual meeting on September 8th when Mr. N. W. Wild (chairman), who presided, said that at June 30th last year the company had eighty-seven shops and the additional twenty-three shops opened during the year had, as a whole, already shown satisfactory results. As those additional shops had been opened at varying dates throughout the year the full benefit of the extension programme was not reflected in the accounts. Given normal working conditions, therefore, it was not unreasonable to expect a further expansion in earnings during the present financial year not taking into account any additional extensions. Their principal subsidiary carried on the business of hire-purchase finance and dealt exclusively with business provided from the company's own shops. A satisfactory feature was that the whole of the business undertaken by the hire-purchase company had been carried out entirely by means of their own financial resources. The remaining subsidiary was a manufacturing company associated with their business and, although their investment there was relatively small, that company had shown a satisfactory profit within the first six months of its existence. With regard to future prospects, there were indications that the radio industry in general would continue to progress. Mr. J. Stone (one of the joint managing directors) said that in his view, what was known as the saturation point in the industry was far from being reached as yet. He personally doubted whether there was any such saturation point. Apart from the many thousands of people who had never yet possessed a radio receiver, the ever-changing designs and the continuous improvements in manufacture were continually converting old customers into new customers.

Waite & Son, Ltd., report a profit for the year ended March 31st last of £3,768. Under the donating agreement profits prior to incorporation were given to the shareholders of the company, subject to a charge of 6 per cent. interest on the purchase consideration payable to the vendors. These profits amounted to £2,013 and the interest charge to £1,394. There is thus a balance distributable to the shareholders of the company under the agreement of £618. In their report the directors state that they are disappointed with the year's working, and they refer to the delay involved in the rebuilding of the premises which were damaged by fire. The board decided that it would be desirable to rebuild on a much larger scale than the original, and the building now erected gives over 50 per cent. additional floor space. In view of the disappointment to the shareholders the directors have arranged with the vendors that the interest on the purchase consideration should be given to the shareholders and paid to them, together with the £618 referred to, so that the total sum to be distributed will be £2,013. This involves a distribution of 0.69027d. per share not liable to tax. In effect this is equivalent to a tax-free return of 6 per cent. for the period from the date of incorporation to March 31st, 1937. From the profit of £1,755 the directors propose to place £750 to reserve for obsolescence of press tools, stencils, &c., leaving £1,005 to be carried forward.

The Killamarsh and District Electric Supply Co. reports a profit for the year of £659 (against £602), which with the amount brought in makes a disposable balance of £726. Reserve receives £300 and a dividend of 6 per cent., tax free, is paid, leaving £142 to be carried forward.

The Western Union Telegraph Co. has decided to defer payment of the quarterly dividend until later in the year, when it is hoped that the "business trend will be more accurately appraisable."

British Insulated Cables, Ltd. has declared an interim dividend of 5 per cent. on the ordinary stock. This is at the usual rate, but is payable on capital of £2,000,000 as increased by the recent bonus issue of £333,334.

The English Electric Co., Ltd., is paying the dividend on the 6½ per cent. cumulative preference stock in respect of the half-year ended June 30th.

The Automatic Telephone & Electric Co., Ltd. is paying an interim ordinary dividend of 3 per cent., actual, less tax (same).

The Lancashire United Transport & Power Co. is paying an interim dividend of 2½ per cent. on the ordinary shares (unchanged).

A. Reyrolle & Co., Ltd., are maintaining the interim ordinary dividend at 5 per cent.

The Electric Supply Corporation has announced an interim ordinary dividend of 3½ per cent., less tax (same).

The British Thermostat Co., Ltd. has declared an interim dividend of 6⅜ per cent., less tax (against 5 per cent.).

The Scottish Power Co. is paying an interim dividend of 2½ per cent. (same).

The Hendon Electric Supply Co. has announced an interim dividend of 2½ per cent., tax free (unchanged).

The Telephone & General Trust has announced an interim dividend of 3 per cent. on the ordinary stock (unchanged).

Stocks and Shares

TUESDAY EVENING.

THE dominant factor in the Stock Exchange situation continues to be the course of prices in the American market. These in their turn are affected by the war in the Far East, and, domestically, by the reported slowing-up of business in the United States. An example of the way in which business in America is being conducted just now is shown by the Western Union July statement, which gives the gross earnings in that month as nearly 8½ million dollars. Owing to increased costs, of wages and taxes, the net earnings came out to no more than 72,000 dollars, less than a tenth of the company's net earnings in July last year.

The wild movements in American shares have already led to the possibility of losses on a large scale having to be faced by speculators at the Stock Exchange Settlement on Thursday next week. As one result of this, selling of good-class stock, in order to provide money with which to meet differences, has been in progress.

Gilt-edged Market

Another week of political and financial tension has done nothing to shake the steadiness of prices in the gilt-edged market. Quotations have, indeed, moved scarcely at all since the international situation took on its present gravity. In a market usually sensitive to political alarms, this firmness has pleasantly surprised those people who had expected at least a moderate set-back. Apprehension has been concerned with the possible effects of nervous liquidation at a time when buyers are scarce. That adequate support is forthcoming may be due in part to the fact that investment gains, in periods of uncertainty, a natural partiality for securities carrying a minimum of risk. Money has, at present, little appetite for speculative purchases, and is chary even of the best industrial equities. Such conditions add to the pressure of idle funds. These continue to find partial outlet through Government issues and other stocks of the highest class.

Wall Street Slump

This week's tidal wave of selling in Wall Street took many American prices to levels lower than have been reached for a year or more. The two main sources of apprehension are mentioned above. Nevertheless, the British onlooker is at something of a loss to understand why the fall in prices should have developed into what looks, in comparison with London's sang-froid, not unlike panic. At the seat of the trouble is, apparently, a loss of hopefulness over America's domestic trade outlook, although it seems to British eyes that a few unfavourable indications have been allowed to cover a number of bullish factors. Other explanations of the slump mostly boil down to Wall Street's notorious inability to steer a middle course. No sooner does it begin to lose faith in the materialisation of an expected boom than it foresees a collapse of 1929 calibre. The present depression is the more surprising because European funds have, for some time, been flowing across the

Atlantic in search of security removed from the scenes of potential trouble in Europe and elsewhere.

Repercussions

Coming at a time when sentiment, almost as much as actual buying and selling, is dictating the course of Stock Exchange prices, the Wall Street flurry could scarcely avoid having an unwelcome effect on London securities. The American market's slump, in the face of spectres apparently less frightening than our own, puts a mild strain on the confidence shown by British investors in their own stocks and shares. In addition, London markets become implicated in more concrete manner by reason of the occasional necessity for jettisoning securities of all kinds to pay for differences incurred through transactions in American stocks. It sometimes happens, in this way, that quotations are depressed by factors with which the issues concerned have no proper connection. These influences, both sentimental and practical, serve partly to explain the losses shown against some of the soundest British industrial issues in the accompanying price-lists.

Cable and Wireless

Cable and Wireless stocks are, by their nature, something of a barometer to the international atmosphere. Clouds hanging over Europe and the East have accordingly depressed the prices of the stocks. Last week saw losses of two points in the ordinary and of one point in the preference. These stand now at 78¾ and 104, respectively. About a month ago the respective quotations were 86 and 107. These falls must be referred to the dull tone of market sentiment, supplemented by forced sales; the monthly traffic figures have given no cause for uneasiness. The price of the income stock remains at 101½. It is expected that message-rates will shortly be reduced. Globe Telegraph ordinary lost some of the recent rise with a decline, in sympathy with Cable and Wireless stocks, to 16¾. Marconi-Marines lapsed from 37s. 6d. to 36s. 3d., although shipping shares were among the few firm spots in industrial markets. Western Unions came down from 43 to 38 within the space of two hours. The price subsequently rallied to 39. American Telephone and Telegraph is down 5 points to 162½.

Equipment and Manufacturing

In the idleness of industrial markets as a whole the tendency is for prices to drift downwards. Shares have depreciated, as a rule, in proportion to the degree of risk which they involve. The sounder descriptions, including many of the leading electrical equipment issues, retain a good measure of strength. In these instances such falls as occur are seldom of any great consequence. During the past week Crompton Parkinsons dropped with some abruptness from 57s. 6d. to 52s. 6d., but regained half the loss in a rally to 55s. Associated Electricals lost half a crown, to 47s. Enfield Cables and Electric Constructions shed ⅛, to 5 1/16 and 2 respectively. Central Electrics lost 3s., going back to 83s. Others to lose ground were Henley's, now 19s. 6d., and English Electrics, which are a few pence down at 34s. 6d. A further decline in Brush lowered the price to 44½, and Siemens eased off to 33s. 3d. Crabtree Industries lost 1s., to 32s. 3d., and Laurence Scotts ⅛, to 2⅜. Switchgear and Cowans, at 19s., and Ismay Industries, at 5s. 9d., show small declines.

Interim Dividends

The interim dividend of 5 per cent. which has been declared by British Insulated Cables is at the same rate as last year's, but is payable on capital increased by the distribution, six months ago, of a free one-in-five scrip bonus. Although the shares declined by ⅛, to 4¾, after the announcement, expectation was fully satisfied. The market expects profits to expand this year sufficiently to maintain the 20 per cent. dividend on the larger capital.

British Insulated Cables holds the "A" deferred capital of Automatic Telephone and Electric, which company is repeating its previous interim dividend of 3 per cent. The last final dividends brought the total distribution on the ordinary and deferred shares to 10 per cent., an increase of 1 per cent. on the 1935 totals. The ordinary shares are a steady market at 43s. 9d. The "B" deferred stand at 41s.

British Thermostat announces an interim payment of 6¾ per cent., against 5 per cent. at this time last year, when the total distribution was subsequently brought up to 17½ per cent. Expectation looks for this year's total to reach not less than 20 per cent. The 5s. shares are quoted at 20s. In the electricity supply market, British Power and Light eased slightly, to 28s. 6d., although the interim payment of 2 per cent. is being maintained on this year's larger capital.

Miscellaneous Matters

Prices in the list of home electricity supply companies have been maintained without difficulty. Practically the only change worthy of mention is a rise of 1/16, to 2⅛, in Midland Electric Power. In the foreign section, Palestine "A," at 36s. 9d., and Perak Hydros, at 27s. 3d., are on the weak side. The traction group is notable for a drop of 125 points in the price of British Electric Traction deferred, which is reduced now to 1,075. Tillings are steadier, at 57s. 6d., and Home Rails have been putting up some resistance. London Transport "C" stock has sagged slightly to 81. Iron and steel shares are a dullish market. Babcock and Wilcox have given way to 46s. 3d., and Vickers to 29s.

Share List of Electrical Companies

	Dividend. Nom.	Previous.	Last.	Price Sept. 14.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/6	—	4 7 0
Clyde Valley	1	7	8	40/6	—	3 19 0
County of London...	1	10½	10½	49/-	-1/-	4 5 9
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	39/-	—	4 12 4
Elec. Dis. Yorkshire	1	9	9	41/-	—	4 7 10
Elec. Fin. and Securities... ...	1	12½	12½	2 11/16	—	4 13 0
Elec. Supply Corporation ...	1	11	12	52/6	—	4 11 5
Lancs Light and Power	1	7½	7½	34/-	—	4 8 3
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red. ...	Stock	5	5	106½	+1	4 14 0
Metropolitan	1	10	10	46/-	—	4 7 0
Midland Counties	1	7½	8	38/-	—	4 4 8
Mid. Elec. Power	1	8	9	2⅛	+1/16	4 4 8
North Eastern Electric Ordinary	1	6	7	32/6	—	4 8 2
Do. 7% Pref.	1	7	7	34/-	—	4 2 4
Northampton	1	10	10	46/3	—	4 8 7
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary ...	1	10	10	49/3	—	4 1 2
Do. do. 6% Pref. ...	1	6	6	30/6	—	3 13 8
Scottish Power	1	8	8	37/6	—	4 5 4
South London	1	7	7	32/-	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	23/-	—	6 10 5
Yorkshire Elec.	1	8	8	39/6	—	4 1 1
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	112½	-½	4 9 0
Do. 1955–75 ...	,,	5	5	115	—	4 7 0
Do. 1951–73 ...	,,	4½	4½	109	—	4 5 7
Do. 1963–93 ...	,,	—	3½	97½	—	3 11 10
London Elec. Trans. Gtd ...	,,	—	2½	86	—	2 18 1
London & Home Counties, 1955–75	,,	4½	4½	111	—	4 1 1
London Passenger Transport, A...	,,	—	4½	113½	—	3 19 4
Do. do. B...	,,	—	5	117½	—	4 5 1
Do. do. C...	,,	4	4	81	-½	4 18 9
West Midlands Joint Elec. 1948–68	,,	—	5	110½	—	4 10 8
TELEGRAPH AND TELEPHONE.						
American Tel. & Tel.	$160	9	9	162½	-5	5 10 9
Anglo-Am. Tel. Pref.	Stock	6	6	121½	—	4 18 9
Do. Def.	,,	1½	1½	29½	—	5 1 8
Cable & Wireless 5½% Pref. ...	,,	4½	5½	104	-1	5 5 9
Do. Ord.	,,	—	—	78½	-2	—
Do. Income	,,	—	—	101½	—	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	16¾	-⅛	3 5 8
Do. do. Pref.	10	6	6	14½	—	4 5 9
Great Northern Tel.	10	20	20	42	—	4 15 3
Marconi-Marine	1	10	7½	36/3	-1/16	4 2 9
Oriental Telephone Ord.	1	12*	12*	3⅛	—	3 16 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	5/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	20½	—	—
British Electric Traction Def. Ord.	,,	5	5	1075	-125	—
Do. do. Pref. Ord.	,,	8	8	168	—	4 15 5
Brazil Traction	$100	40 cts.	50 cts.	22½	—	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds...	$500	5	5	35	+2	—
Victoria Falls Ord.	1	20	12	63/9	-½	3 15 6
West Riding	1	6½	10	42/6	-1/16	4 14 1
MANUFACTURING COMPANIES.						
Aron Electricity Ord.	1	15	15	2½	—	6 0 0
Assoc. Elec. Ord.	1	8	10	47/-	-½	4 5 1
Do. Pref.	1	8	8	37/6	—	4 5 3
Babcock & Wilcox	1	8	10	46/3	-1/3	4 6 7
British Aluminium Ord.	1	7½	10	53/6	-1/6	3 14 9
British Insulated Ord.	Stock	20	20	4¾	-¼	4 4 0
Brush Ord	Stock	Nil	Nil	44½	-3	—
Callender's	1	15	15	4 13/16	—	3 2 3
Do. 6½% Pref....	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord. ...	5/-	12½	12½	2¾	-¼	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	2	-¼	5 0 0
Enfield Cable Ord.	1	25	25	5 1/16	-¼	4 10 0
English Electric	1	Nil	Nil	34/6	-6d.	—
Do. do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/-	20	25	2¾	—	2 7 6
Ever Ready	5/-	35	45	30/9	-9d.	7 6 4
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	83/-	-3/-	4 4 4
Henley's	5/-	30	15	19/6xd.	-1/-	3 17 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	7½	10	46/3	—	4 6 6
Lancashire Dynamo	1	10	20	3 1/16	—	5 8 4
Siemens Ord.	1	6	7½	33/3	-1/16	4 10 3
Telegraph Construction	£1	Nil	7½	2⅜	—	2 17 2

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1395

31651. "Television tube." Radioakt.-Ges. D. S. Loewe. November 20th, 1934. (470496).

35129. "Suspension oil-bath electric insulators." Compagnie Générale d'Electro-Ceramique. December 21st, 1934. (470635.)

35394. "Electrical oscillation generators." Telefunken Ges. für Drahtlose Telegraphie. December 20th, 1934. (470752.)

1936

1206. "Adjustable arm or bracket for lamps and other articles." H. Macnaughton-Jones, B. M. J. Davis, and Benjamin Electric, Ltd. January 14th, 1936. (470502.)

1233. "Cleating or anchoring systems for multiple electric wires or pipes." G. Pailin and Ferguson Pailin, Ltd. January 14th, 1936. (470637.)

1250. "Alternating-current apparatus responsive to capacative and inductive reactances." C. E. Every-Clayton (F. L. Smidth & Co., Aktielskab). January 14th, 1936. (470504.)

4834. "Safety switches for electrically heated appliances." Bulpitt & Sons, Ltd., and W. H. Bulpitt. February 17th, 1936. (470506.)

4835. "Multi-grid thermionic valve oscillators." Bronzavia Soc. Anon. February 28th, 1935. (470572.)

4851. "High-frequency electric cables." Telegraph Construction & Maintenance Co., Ltd., E. W. Smith, J. N. Dean and F. Mattingley. February 17th, 1936. (Cognate application 21156/36.) (Addition to 467268.) (470760.)

4955. "Reduction of intermodulation in two-way communication cables." Standard Telephones & Cables, Ltd., and K. E. Latimer. February 18th, 1936. (470645.)

4958. "Electrolytic processes and apparatus." L. Delavenna and J. Maillard. February 25th, 1935. (Cognate application 4959/36.) (470762.)

5093. "Electro-magnetic machines with longitudinally-moving armatures." N. Sandor. February 20th, 1936. (470767.)

5144. "Electric-discharge lamps." General Electric Co., Ltd., V. J. Francis and J. W. Ryde. February 20th, 1936. (Cognate applications 5889/36, 5892/36 and 946/37.) (470770.)

5154. "Control systems for regenerative braking of electric motors." British Thomson-Houston Co., Ltd., H.W.C. Liddiard and T. H. Petch, jun. February 20th, 1936. (470771.)

5206. "Electric motor generator sets." G. M. Pestarini. February 20th, 1936. (470775.)

5232. "Electric resistance heating elements." T. Price & Son (Stampers), Ltd., and T. R. Price. February 21st, 1936. (470827.)

5278. "Television and like systems." Baird Television, Ltd., and V. A. Jones. February 21st, 1936. (470785.)

5288. "Electric motor control systems." British Thomson-Houston Co., Ltd., and H. V. Benns. February 21st, 1936. (470711).

5668. "Electric smoothing-iron with safety switching arrangements." E. L. M. Van Gelder. February 25th, 1936. (470510.)

7113. "Electrical protective arrangements." S. Farrer, G. Pailin and Ferguson Pailin, Ltd. March 9th, 1936. (470514.)

8282. "Telegraph signalling apparatus." Cable & Wireless, Ltd., and A. M. Humby. March 19th, 1936. (470654.)

10106. "Safety spark-gap device for magneto-electric ignition apparatus." Scintilla, Ltd. April 6th, 1935. (470517.)

11023. "Wall-boxes for electric switches." H. B. Prentice. April 17th, 1936. (470659.)

11099. "Magnetic circuits for dynamo-electric machines." English Electric Co., Ltd., and E. A. Binney. April 17th, 1936. (470660.)

11986. "Electric switches in sealed containers." W. W. Triggs (T. A. Edison, Inc.). April 27th, 1936. (470590.)

12542. "Spark-chamber for small automatic electric cut-outs." W. Leyhausen. May 3rd, 1935. (470521.)

17694. "Navigation-aiding radio systems." Telefunken Ges. für Drahtlose Telegraphie. June 25th, 1935. (470596.)

20755. "Tuning-indicator for radio receivers and the like." Philco Radio & Television Corporation. April 27th, 1936. (470597.)

20871. "Electric contact making and breaking devices." Electrical Apparatus Co., Ltd., and R. H. Barbour. July 28th, 1936. (470532.)

25331. "Electric amplifiers." Telefonaktiebolaget L. M. Ericsson. September 19th, 1935. (470729.)

25349. "Magneto-electric ignition apparatus." Fabrica Italiana Magneti Marelli. September 20th, 1935. (470730.)

28665. "Phase shifting circuits for radio and like purposes and systems embodying such circuits." Marconi's Wireless Telegraph Co., Ltd. November 9th, 1935. (470543.)

31334. "Electrolytic production of metals." Deutsche Gold- Und Silber-Schneideanstalt Vorm. Roessler. December 12th, 1935. (470733.)

31494. "Method of making articles of aluminium alloys with electrolytic oxide coatings." Vereinigte Aluminium-Werke Akt.-Ges. November 28th, 1935. (470734.)

33692. "Remote-control systems particularly for tuning radio receivers and transmitters." Standard Telephones & Cables, Ltd. February 8th, 1936. (470736.)

34067. "Method of and apparatus for the transmission of signals by means of ultra-short waves." C. Lorenz Akt.-Ges. December 13th, 1935. (470547.)

34261. "Base plate for electricity measuring apparatus consisting of pressed material, preferably artificial resin." Landis & Gyr Akt.-Ges. December 24th, 1935. (470549.)

34860. "Machines for making supporting structures for the filaments of tubular electric incandescent lamps." British Thomson-Houston Co., Ltd. December 21st, 1935. (470551.)

34381. "Method of manufacturing electrode systems with unsymmetrical conductivity." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. December 21st, 1935. (470552.)

35399. "Dynamo-electric machines." G. E. Wagner. February 14th, 1936. (470607.)

35451. "Time-delay electric switches for fire-alarms." H. Howarth. December 24th, 1936. (470555.)

35819. "Electrical condensers and electrodes therefor." Mallory Patents Holding Co., Ltd. February 15th, 1936. (470608.)

35891. "Very-high-frequency receiving and detecting apparatus." Marconi's Wireless Telegraph Co., Ltd. December 31st, 1935. (470805.)

1937

936. "Electrical condensers." P. A. Sporing and Telegraph Condenser Co., Ltd. January 12th, 1937. (470685.)

1321. "Driving wheels on small lighting dynamos for bicycles." W. Hackel and A. Hackel (trading as Hackel Geb.). April 24th, 1936. (Cognate application 1322/37.) (470686.)

2168. "Electrical switching apparatus especially adapted for use with pneumatic tube conveying systems." Lamson Pneumatic Tube Co., Ltd. (E. Krebs). January 25th, 1937. (470560.)

2209. "Electron-discharge tubes." C. Lorenz Akt.-Ges. January 24th, 1936. (470610.)

3443. "Separators for use in electric accumulators and the like." Chloride Electrical Storage Co., Ltd. February 24th, 1936. (470561.)

4257. "Dynamos for cycle lamps." Electrotechnische Fabrik Schmidt & Co., Ges. February 15th, 1936. (Cognate application 4258/37.) (470688.)

4433. "Spark-chamber for small automatic cut-outs." W. Leyhausen. March 27th, 1936. (Addition to 470521.) (470615.)

5039. "Apparatus for changing the frequency of electric oscillatory currents." Siemens & Halske Akt.-Ges. February 20th, 1936. (470619.)

5223. "Electric-discharge lamps. General Electric Co., Ltd., V. J. Francis and J. W. Ryde. February 27th, 1936. (Divided out of 470770.) (Cognate application 5224/37.) (470809.)

5280. "Electrical motor-driven hand tools." Siemens-Schuckertwerke Akt.-Ges. February 22nd, 1936. 470690.)

6881. "Television receivers." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. March 14th, 1936. (470623.)

10515. "Electric switches with self-generated arc-extinguishing blast." British Thomson-Houston Co., Ltd. April 15th, 1936. (470631.)

12590. "Induction voltage regulators." British Thomson-Houston Co., Ltd. May 2nd, 1936. (470812.)

19814. "Means for controlling the excitation of dynamo-electric machines." English Electric Co., Ltd., and H. S. Carnegie. February 18th, 1936. (Divided out of 4935/36.) (470815.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from September 8th.

Etiro. No. 576840. Class 8. Electric cables and flexibles. Condelex Gesellschaft, Zug, Switzerland (British representatives Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, W.C.2).

Dictatype. No. 577519. Class 8. Sound-reproducing and recording apparatus.—Henry Alwyn, 7, Carlisle Avenue, E.C.3.

Maius. No. 857762. All goods in Class 8.—Einar Jacobsen, Berlin, S.O.11. Germany (British representative T. S. Wardle, 4, Pembroke Road, North Wembley, Middlesex).

Hawkseye. No. 578942. Class 15. Reflectors of glass.—O. C. Hawkes, Ltd., Globe Works, Bromsgrove Street, Birmingham.

Dillectric. No. 573089. Class 18. Complete electrically heated vulcanising outfits.—The Dill Manufacturing Co., Cleveland, O., U.S.A. (British representatives Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, W.C.2).

A.S.E.E. Visits

On September 8th members of the Association of Supervising Electrical Engineers, including the president (Mr. H. Hobson) and the president-elect (Mr. J. R. Beard), visited the University of London's new buildings in Bloomsbury, and were conducted through the Senate House block by Mr. J. Stinton Jones, the consulting engineer responsible for the electrical installation. The heating and lighting arrangements were the chief items of interest in the ceremonial hall, conference and dining room, and the small lecture hall, while in the basement the electrical plant attracted much attention, particularly the main heating control panel in the control room. After inspecting the remainder of the switchroom equipment, and being shown the construction of one of the special heating panels, the party viewed the battery charging room and the tour concluded with an examination of the special lighting arrangements in the court room and senate room.

Miners' Lamp

The Secretary for Mines has approved the Ringrose Type C.H.4 lamp for use under the requirements of the Coal Mines General Regulations (Lighting), 1934, and Firedamp Detectors, 1935. This lamp is an electric miners' handlamp, giving illumination up to the standard required, combined with firedamp detecting apparatus similar in principle to that of the Ringrose firedamp alarm previously approved but so arranged that warning of the presence of firedamp is given by pronounced dimming of the working light instead of by a special red light. A push-button switch is provided so that the full light can be temporarily restored, while the workman retires from the place in which the firedamp occurs. The conditions of use for the lamp are contained in the approval order under the Firedamp Detector Regulations, copies of which will shortly be obtainable from the Stationery Office.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Garage and storage accommodation, Richmond Hill, for F. P. Ogston; Walker and Duncan, 10, Golden Square, Aberdeen. Premises, Woodside, for the Aberdeen Savings Bank.

Altofts (NORMANTON).—Houses (48), Lee Brigg; U.D.C. surveyor, Council Offices.

Axminster.—Extensions to carpet factory; W. H. Dutfield, managing director.

Birmingham.—Block of shops, Bristol Road South, Northfield, for Healy & Baker, 29, George Street, Hanover Square, London, W.1.

Blackpool.—Rebuilding the Hippodrome Cinema (2,165 seats); manager.

Bolton.—Alterations and additions to Infectious Diseases Hospital, Hulton Lane; borough engineer and surveyor, Town Hall.

Boston.—Extensions to infants' department, Carlton Road schools, for E.C.; borough surveyor, Municipal Buildings.

Bournemouth.—Police headquarters (1st section), Madeira Road; borough engineer, Town Hall.

Bradford.—Houses (240), Acre estate, Greengates; Greengates Investment Trust. Extensions to Great Horton school (£8,550); city architect.

Bristol.—Houses (20), Wingfield Road; J. Bryant. Motor works and carriage shop (40 acres site), Brislington, for the Bristol Tramways and Carriage Co., Ltd.

Bromsgrove.—Block of shops and flats, New Road, Rubery; S. J. Smith & Co., builders, 70, Newhall Street, Birmingham.

Carlisle.—Offices and flats, Patteril Bank Road; J. H. Martindale & Son. Reconditioning houses, Green Row area (£4,000); Housing Improvement Society, Ltd.

Consett (Co. DURHAM).—Cinema; W. H. Cole, Westmoreland Road, Newcastle-on-Tyne.

Coventry.—Factory, Fletchampstead, for Fisher & Ludlow, Ltd., Rea Street, Birmingham.

Droitwich.—Houses, Albert Street and Manning Street; R. E. Hulse, borough surveyor, Town Hall.

Ealing.—Extensions to Ravenor school, Greenford; F. J. Forty, borough engineer, Town Hall.

Easingwold.—Houses (20); C. W. C. Needham, architect, 3, Duncombe Place, York.

East Riding.—Small holdings, Grange Farm, Market Weighton (£10,749); County Council.

Edinburgh.—Building extensions (including additions to clinical and X-ray department, lecture rooms, &c.) at the Royal (Dick) Veterinary College (£40,000); Lorimer and Matthew, architects, 17, Great Stuart Street.

Essex.—Operating theatres at Oldchurch Hospital, Romford, for C.C.; F. J. Macey, steward, Oldchurch Hospital. Small holdings, Street Farm, South Ockendon (£10,583); county architect.

Fleetwood.—Winter Gardens scheme, for Fleetwood Cinema and Baths Holding Co. (£150,000); R. H. Cunliffe, architect, Victoria Road, Thornton Cleveleys.

Flintshire.—School, Mold, for County E.C.; R. G. Whitley, county architect, County Buildings, Mold.

Gateshead-on-Tyne.—Factory, Team Valley estate, for Messrs. Whyman; North-Eastern Trading Estates, Northumberland Road, Newcastle-on-Tyne.

Glasgow.—Houses (368), North Koppoch and (196) Langholm Street; T. Somers, city architect, City Chambers, Glasgow. Extensions to cinema, Sauchiehall Street; Malcolm Ross and Son, 50, Main Street, Wishaw. School, Red Road, Balornock, for the R.C. Authorities; W. McCaig, 129, Bath Street, Glasgow.

Hamilton.—Garage and storage accommodation, High Blantyre Road, Burnbank, for Laurie, Ltd.; A. Cullen, 92, Cadzow Street, Hamilton.

Hayling Island.—Cinema; H. S. Scott, architect, Colmore Row, Birmingham.

Holywell.—Cinema, Coleshill Street, for the Deeside Enterprises Cinemas, Ltd.; S. Colwyn Folkes, architect, Central Chambers, Colwyn Bay.

Hyde.—School, Newton, for E.C.

Inverness.—Houses (66), South Kessock, for Corporation; burgh surveyor.

Irish Free State.—(BOYLE, Co. ROSCOMMON).—Houses (34), for the Boyle Town Commissioners; McDonnell, Dixon and Downes, architects, 20, Ely Place, Dublin. (DUNDALK, Co. LOUTH).—Houses (30), for the U.D.C.; F. Doris, engineer and town surveyor. (WATERFORD).—Houses (70); David Sheedy, engineer and borough surveyor, Town Hall.

Isle of Wight.—School, Freshwater (£19,332), for Isle of Wight E.C.

Keighley.—Houses, near Grange Road; J. Wharton, builder, Ingrow Bridge.

Kent.—Relief offices, Gillingham (£2,200), education offices, Fort Pitt House, Rochester, education offices and welfare bureau, Carlton Avenue, Ramsgate, branch libraries at Herne Bay, Orpington and Raingam; county architect, Maidstone.

Kettering.—Cinema, facing Russell Street, for J. Sherwood; C. E. Wilford, architect, Leicester.

Kirkintilloch.—Garage and offices (£8,000), with messrooms, machine shops, &c.; D. Lawson, Ltd.

Lanarkshire.—School, Tannochside (£25,000); Loudon and Inglis, builders, Coatbridge.

Leeds.—Flats (88), for T.C. (£19,250); J. L. Whatling, builder, Palmerston Road, Ipswich. Houses and shops (£12,285); Taylor Woodrow Construction Co., Southall, Middlesex.

Liverpool.—Cinema, Church Road, Wavertee, for the Regal Cinema Co.; A. E. Shennan, architect, Liverpool.

London.—(BELLINGHAM).—Flats (126), Sydenham Vale estate; T. Spencer Bright & Co. (CATFORD).—Houses, Hall Park estate; A. J. Glock, Ltd. Houses and flats, Datchet Road and Winsford Park; New Ideal Homesteads, Ltd. Flats, Bromley Road; Wates, Ltd. Flats, Canadian Avenue; Wright & Renny. Alterations to Park Cinema, Hither Green Lane; L. H. Kemp. Shops and flats, St. Lawrence Road; Hastie, Winch & Co. (DEPTFORD).—Extensions to oil refinery, Creek Street; Medina Refinery, Ltd., Sun Wharf, Creek Street, S.E.8. (LEWISHAM).—Houses, near Somertrees Avenue; Ball (Builders), Ltd., 120, Lee High Road, S.E.15. (NEW CROSS).—Shops, New Cross Gate; Southern Railway Co. (SYDENHAM).—Flats, Russell Street; L. A. Culliford & Partners. Block of flats, Addington Grove; Furnsales, Ltd. Factory, Kent House Lane; Hal Williams & Co.

Manchester.—Houses (32), Caldecott Road, Blackley, for J. Saxon, 27, Brooklands Road, Crumpsall; Roberts, Wood & Elder, architects, 26, King Street. Houses, Eastholme Drive and Henderson Street, Levenshulme; Wilham Estates, Ltd., 27, Brazennose Street. Houses (30), Factory Lane and Selwyn Avenue, Blackley; R. Taylor (Builders), (1936), Ltd., Manchester Old Road, Middleton. Hangar, terminal building, superintendent's house, &c., Manchester (Ringway) Airport, for the Airport Committee; city architect, Town Hall. School, Barford Road and Clarendon Road, Whalley Range; managers, St. Margaret's Central school, Moss Side. Cinema, café and dance hall at the corner of Oxford Street and Portland Street; R. C. Roy, 25, Cross Street.

Mansfield.—Municipal museum, behind the Public Library; T. Waude Thompson, architect, Mansfield.

Market Harborough.—Covered market, Northampton Road (£4,500); J. C. Barlow, surveyor.

Montrose.—Staff quarters, Montrose Aerodrome (£22,000), for Air Ministry; R. Pert & Sons, contractors, Bridge Street.

Morley.—School, Drighlington, for E.C.; F. Turner, borough engineer, Town Hall.

Morpeth.—Houses, Broomhill and Ulgham Grange; R.D.C. surveyor.

Newburn-on-Tyne.—Houses (156), Westerhope; U.D.C. surveyor.

Newcastle-on-Tyne.—Block of flats; G. A. Fortescue, architect, 30, Bedford Square, London, W.C.1. Showrooms, Hancock Street, for G. E. Elliott; J. N. Fatkin, architect, 17, Bigg Market. Rebuilding of premises for J. Dampney & Co.; Stephen Easten, Ltd., builders, Milburn House.

Newport (MON).—Factory, for the British Aluminium Co., Ltd., Adelaide House, King William Street, E.C.4.

Oldham.—Library, &c., Stoneleigh Park (£15,414); borough engineer.

Ossett.—School, Station Road, for E.C.

Rowley Regis.—Municipal buildings; Jas. M. Tate & Son, builders, Cradley Heath.

Scarborough.—Additions to Convent school, Queen Street; Jones & Rickaby, architects, 102, Westborough.

Southport.—Art school section for the technical college (£17,500), for E.C.; Jonathan Partington, Ltd., builders, Middleton Junction, Middleton.

Stalybridge.—Extensions to Fire station; W. Storrs, Sons & Co., Ltd.

Suffolk.—School, Beccles; East Suffolk county architect.

Sunderland.—Nurses' home, Havelock Terrace, for the Governors of the Royal Infirmary; W. and T. R. Milburn, architects, 17, Fawcett Street. Offices, Back Lisburn Terrace, for T. S. Foster & Son, Ltd.; G. T. Brown & Son, architects, Fawcett Street. Alterations to the Theatre Royal for the Blacks Theatres, Ltd.; E. M. Lawson, architect, Barras Buildings, Newcastle-on-Tyne. Houses (194), Ryhope, for R.D.C.; L. W. Evans, contractors, Norfolk Street.

Swansea.—Training college of domestic art (£25,000); University College of South Wales. Cinema, for the Manor Cinema (Swansea), Ltd.; Ivor Evans & Benjamin, solicitors, 16, Northampton Place. Additions to Landore cinema, Neath Road; W. Hyman.

Thirsk.—Dwellings (32), Sowerby; C. W. C. Needham, architect, 3, Duncombe Place, York.

Torquay.—Nurses' home, Barton Road; Arthington, Ltd. Service flats, Asheldon Road; Hooper & Wollen.

Tow Law (Co. DURHAM).—Houses (36), Attwood Road (£14,945), for North Eastern Housing Association; J. Thorns, contractor, Willington, Co. Durham.

Truro.—Nurses' hostel to the Royal Cornwall Infirmary; A. J. Cornelius, architect, Truro.

Wakefield.—Municipal baths, Sun Lane (£50,000); surveyor. School, Hornsea (£7,631); J. Taylor & Son. Extensions to Sandal Infants' school; housing architect. Houses (54), Grigglestone, Crofton and Sharlston (electrical work); W. E. Massie, R.D.C. surveyor, Council Offices, 18, St. John's North, Wakefield.

Walsall.—Houses, Holly Lane, Walsall Wood (electrical work); J. E. Guest, Birmingham Road.

West Hartlepool.—Houses, Ventnor Avenue, for the Public Trustee; J. H. Garry, architect, 47, Church Street. Houses, Wharton Terrace, for F. M. Gibbon, Ltd.; Bell & Bell, architects, 2, Whitby Street.

West Riding.—Reorganisation of premises, and alterations, Barnsley Road Council School, Wombwell, for E.C.; Education Officer, County Hall, Wakefield.

Whickham-on-Tyne.—Hotel, for J. Rowell & Son; C. S. Errington, architect, 46, Grainger Street, Newcastle-on-Tyne.

Wincanton.—Houses (30), Templecombe, Horsington and North Cheriton; R. Earnshaw, architect, Council Offices, Wincanton.

Wolverhampton.—Block of flats, Compton Road; T. Wellings & Son, builders, Broadmore, Penn. Buildings for the Co-operative Society, Barnhurst.

York.—Houses (24), Maple Grove; W. S. Mobley. School, Margaret Street; St. Georges R.C. trustees.